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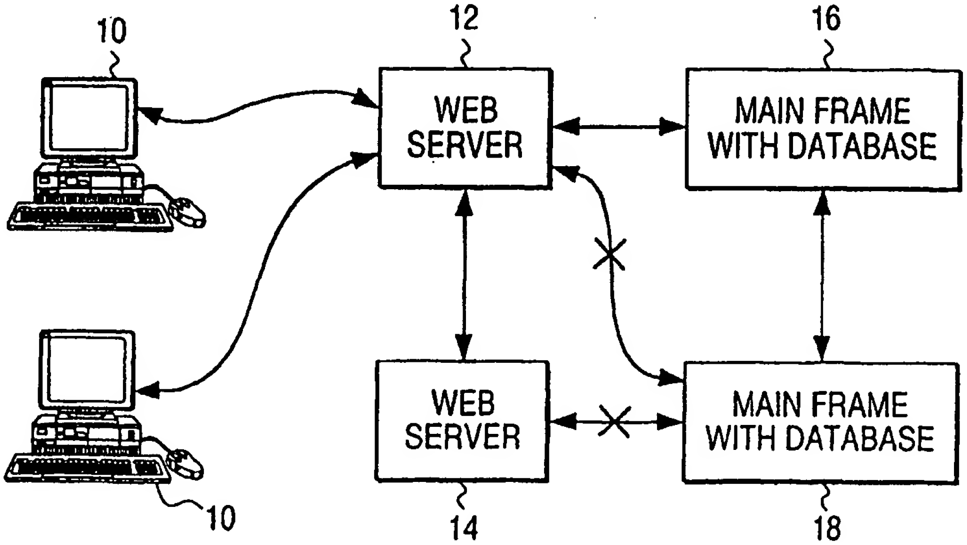

(57) Abstract

A method of providing Web access to data using dynamic generation of Web pages by a mainframe computer (16, 18) connected to a Web server (12, 14). The mainframe computer (16, 18) has legacy programs, legacy data, and legacy subroutines on it (legacy means existing information systems which may not be specifically adapted to Web access). A Web control program on the mainframe generates Web pages for the user. A state key is generated by the mainframe upon a user inputting identification data and is used to determine access allowed without the user reentering identification data.

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WEB PAGE ACCESSING OF DATA BASES AND MAINFRAMES

Copyright

Background of the Invention

The present invention relates to distribution of information over a computer network using hypertext links and Web pages. More specifically, the present invention relates to information distribution by interaction of a Web page on a client, a Web server connected to the client via the Internet, and programs, such as a database program, on a mainframe computer.

The explosive growth of the Internet over the last several years has dramatically improved the ability to quickly distribute vast amounts of data to any interested person. Additionally, the use of cookies, Secure Sockets Layers (SSL), and numerous other techniques have allowed the Internet to provide distribution of information restricted to an authorized person only.

An example may best illustrate some considerations in the situation. A book store may have a Web server that allows customers and potential customers access to information. The information might be "unrestricted access" information such as a list of books that the book store is willing to sell. The information might be "customer specific" information, such as the list of books currently under order by a customer, the customer's account balance, or other such information that should be accessible only to the given customer (apart from appropriate employees of the book store who may need access to such restricted information). Moreover, there might be information available to a class of customers, but which should not be accessible by all persons. Thus, a list of books at special discounted prices could be available to any member of a preferred buyer group, but not to others.

Regardless of whether information is unrestricted, restricted to a single user, or has some intermediate level of restriction, distribution of the information via the Web requires that a Web server handle the information. Several methods exist to enable the Web server to handle the information.

The most direct technique is for the book store's programmers or other employees to put the information on the Web server. Thus, a book store setting up a Web site can simply take its list of books from whatever computer it is currently stored on and reformat the list as needed. However, when the list is updated at its current storage location (such as a mainframe computer), the book store's employees would also have to update the list on the Web server. The disadvantages of requiring the same information to be updated at multiple storage locations (such as in the mainframe computer and in the Web server), the possibility of data updates being made inconsistently, and the increase in storage demands required when the data must be stored in one location (such as a mainframe) for internal company use and in another location (such as a Web server) for access via the internet or other outside access.

Another technique for providing Web access to data is for the book store's programmers to write specific interface programs to translate data stored in a database on the book store's mainframe computer. For example, an interface program can convert database data into hypertext markup language (HTML) such that a Web browser may display the data as a Web page. However, generating such interface programs requires skills that may be outside the experience of the employees who manage the mainframe and its databases. Further, such interface programs may be required for different types of data access. If a list of available books is stored in one database with a given format, and a list of customers is stored in a different format in a different database, a different interface program may be required for each. Considering also that a list of book publishers may be stored in yet another format and that the book store might allow each book publisher to view its own account information, yet another interface program would have to be developed. Developing interface programs for each database or each data format is expensive and time-consuming.

In addition to problems associated with allowing Web access to data on mainframe databases, security considerations often complicate access to information. For example, if the book store wanted to allow customers access to details about the status of their book orders or their account, the Web server often places a so-called cookie on the customer's computer. The cookie is a small file of data or code identifying the customer□s computer to the Web server. However, many computer users do not want their computers accepting cookies from Web servers and they therefore limit the use of this. A further problem with some Web access security arrangements is that some are too easily overcome. For example, a person may "spoof" another's identity (impersonate another) in order to obtain restricted data.

Yet another consideration in distributing large amounts of data via the Internet is the need to be able to manage and administer a Web site. Often Web site management requires complex knowledge and considerable effort. Changing the appearance of a Web page (such as changing the presentation of data on a Web page) can be a time-consuming process which requires highly specialized expertise. (As used herein, changing the appearance means causing the Web page to appear differently to all who access it by causing it to display data from the computer storing the Web page, and shall not include simply appending user comments or designs to a Web page as is common for Web-based bulletin board or public comment boards.)

Objects and Summary of the Invention

Accordingly, it is a primary object of the present invention to provide a new and improved technique of distributing data via the Internet or other computer network, bulletin board, etc.

A more specific object of the present invention is to provide for Internet distribution of data stored in a database without the need for storing the data on a Web server.

A further object of the present invention is to provide ready Web access to data stored in various formats without the need to develop different programs.

Yet another object of the present invention is to provide a new and improved security arrangement for limiting access to Web data to authorized users.

A further object of the present invention is to provide convenient management of a Web site without requiring advanced programming skills or expertise in HTML.

The above and other features of the present invention which will be more readily understood when the following detailed description is considered in conjunction with the accompanying drawings are realized by a method of providing Web access to data. A Web server for distribution of data to users is provided. A database is provided on a database computer operably connected to the Web server, the database having a database program that provides data in a given format. Upon a user requesting data in the database, the Web server forwards the request to the database, the database program accesses the data in the given format. The database computer runs a Web control program that generates a Web page with the requested data and supplies the generated Web page to the user. The Web control program marries file definition objects and page definition objects to generate Web pages. The Web server is on a Web server computer different from the database computer. The database computer is a mainframe computer. The mainframe computer supplies the generated Web page to the user via the Web server computer. Upon a user requesting data not in the mainframe computer, the Web control program causes the mainframe computer to access data on a remote computer and the Web control program then generates a Web page with the requested data and supplies the generated Web page to the user. Responsive to a user, the Web control program calls a subroutine on the mainframe computer, which subroutine is independent of the Web control program and is a legacy subroutine. The method further includes the steps of: having a user supply an identification code, forwarding the identification code from the Web server computer to the mainframe computer, the Web control program then generating a state key, incorporating the state key into a Web page supplied to that user, and wherein the mainframe computer detects the state key from the Web page upon the user requesting data and decides whether that user can access the requested data based on the state key. The state key is randomly generated for a given access session and the state key loses its ability to authorize data access if it is not sent by the user to the mainframe computer at least once during a time-out interval. The Web control program receives a page change command from a user using a Web browser and, responsive to the page change command, the Web control program changes a given Web page to a changed Web page such that any users accessing the given Web page now receive the changed Web page, the page change command changing the appearance of a given Web page.

The present invention may alternately be described as a method of providing Web access to data, the steps including: providing a Web server for distribution of data to users; providing a database on a database computer operably connected to the Web server, the database having a database program that provides data in a given format; providing a Web control program on the database computer; having a user supply an identification code to the Web server, the Web control program then generating a state key and incorporating the state key into a Web page supplied to that user, and wherein the database computer detects the state key from the Web page upon the user requesting data and decides whether that user can access the requested data based on the state key. The state key loses its ability to authorize data access if it is not sent by the user to the database computer at least once during a time-out interval. The Web server is on a Web server computer different from the database computer. The method of further includes the step of forwarding the identification code from the Web server to the database computer. The database computer is a mainframe computer. The state key is randomly generated for a given access session.

The present invention may alternately be described as a method of managing a Web site, the steps including: providing a Web control program on a computer; having the Web control program receive a page change command from a user using a Web browser to access the Web site; and, responsive to the page change command, the Web control program changing a given Web page to a changed Web page such that any users accessing the given Web page now receive the changed Web page, the page change command changing the appearance of a given Web page. The Web control program marries file definition objects and page definition objects to generate Web pages.

The computer having the Web control program is a mainframe computer and users request data on the mainframe computer via a Web server on a Web server computer. The Web control program generates HTML through a completely table driven process, independent of file definitions and page definitions. The method further includes the steps of: having a user supply an identification code, forwarding the identification code from the Web server computer to the mainframe computer, the Web control program then generating a state key, incorporating the state key into a Web page supplied to that user, and wherein the mainframe computer detects the state key from the Web page upon the user requesting data and decides whether that user can access the requested data based on the state key.

The method further includes the steps of: providing a database on the mainframe computer, the database having a database program that provides data in a given format; upon a user requesting data in the database, the Web server forwarding the request to the database, the database program accessing the data in the given format, and, by operation of the Web control program, generating a Web page with the requested data and supplying the generated Web page to the user.

Brief Description of the Drawings

The above and other features of the present invention will be more readily understood when the following detailed description is considered in conjunction with the accompanying drawings wherein like characters represent like parts throughout the several views and in which:

FIG. 1 is a simplified diagram of the arrangement used for the present invention;

FIG. 2 is a simplified view of the appearance of a Web page according to the present invention;

FIG. 3 is a simplified view of the appearance of an identification Web page according to the present invention;

FIG. 4 is a simplified view of the appearance of a restricted Web page according to the present invention;

FIGS. 5A and 5B are parts of a simplified overall flowchart of the handling of a Web request for data;

FIG. 6 is a flowchart of function determination, showing more details of parts of the flowchart of FIGS. 5A and 5B;

FIG. 7 is a flowchart of driven Web page data access; and

FIG. 8 is a simplified diagram illustrating a recursive Web page change feature of the present invention.

Detailed Description

Turning now to FIG. 1, some very basic concepts of the present invention will be discussed. Users accessing the World Wide Web of the Internet use their computers 10 running a Web browser program to access a Web server 12. (For ease of illustration, connections intermediate to the computers 10 and Web server 12, such as computers of an Internet service provider, are not shown.) The Web server 12 may be connected to receive information from another Web server such as 14. Additionally, the Web server 12 is connected to a mainframe computer 16 that has legacy programs, legacy data, and legacy subroutines on it. (Legacy means existing information systems which may not be specifically adapted to Web access).

Previously, and as discussed in the background above, providing access to data on the mainframe via the Web required one to select from a number of unattractive options. The data could be duplicated on the Web server with the associated expansion in storage demands and increase in complexity in updating data (the data would have to be changed at each location where it is stored). Alternately, specific programs could be developed to allow Web access to particular data in the mainframe.

Advantageously, the present invention uses a Web control program that can generate Web pages in response to requests by users at computers 10. The Web control program runs on the mainframe 16 and generates the HTML needed to display particular data as part of a Web page. The Web access program on computer 16 additionally may, in response to a request for data that is not stored on mainframe computer 16, send a request for the data to another mainframe 18, receive the requested data back, put it into Web format (i.e., mark it up into HTML), and supply the Web page to the user. The mainframe computer 16 can access data at other computers by EDI (electronic data interchange), over TCP/IP (transport control protocol/internet protocol) or other protocols.

The Web control program is part of a Web management system also including a program that runs on the Web server 12, which Web server is preferably running on a separate computer from the database-holding mainframe computer 16. In the discussion that follows, the Web management system will be referred to by the name EAGLE (Enhanced Application Generation Language for the Enterprise). EAGLE consists of several different and distinct parts including:

- There is a C program that runs as a CGI (common gateway interface) program on a Web server to extract and format data from forms that are submitted from a Web browser.

- There is a routing mechanism and a management structure for invoking CICS programs that can (Note: CICS is an IBM trademark.) produce Web pages. (As used herein, CICS stands for customer information control system running on the mainframe.) These pages can be created in any one of the three methods described below. Pages that are generated may then be interactively enhanced with styles, buttons, files to be read and/or updated, subroutines to be called, and many other variables using CICS-created objects.

- There is a state engine that keeps track of Web users and is able to maintain a session for Web users as well as do timeouts and re-establish sessions using CICS programs.

- There is a CICS-based HTML generator that allows interactive creation of Web pages that can manipulate mainframe databases by reading, browsing, and updating VSAM and DB2. This one module can manage any number of different files, including fixed-length and segmented VSAM files, as well as DB2 databases. This program uses CICS-created objects for HTML generation including (but not limited to) file definitions, page definitions, drop-down lists, and Web page text.

- There is a set of development tools that facilitate the writing of EAGLE subroutines by generating object modules from simple templates that at the same time allow very flexible customizing of the modules. These object modules have the ability to read, browse, and update mainframe databases including VSAM (a specific brand name of indexed file structure) and DB2. (a specific database).

- Programs can be written and executed in any CICS-supported language without using any of the EAGLE development tools.

- This product can send and receive TCP/IP requests from any TCP/IP enabled source including Internet e-mail.

- Except for the C program that resides on the Web server, all of the programs are written in CICS Command Level Assembler language and run on IBM mainframes. This allows a level of security and scalability not found in other multi-tiered products. This would be especially useful in providing legacy mainframe systems and databases with Web access.

- All of the CICS objects necessary for operating EAGLE are created and maintained via the Web using EAGLE itself or by using mainframe terminal sessions (i.e., IBM3270).

Before supplying some specific examples of the Web management system in operation, some highly advantageous aspects of EAGLE will be discussed.

The combination of a CICS-based state engine and a program management structure that allows dynamic invocation of CICS programs means that the Web pages managed by EAGLE are associated with CICS-based objects that can be created and maintained interactively via the Web. Any Web page which is a part of EAGLE may call any subroutine, specify any files, pass variable data to the called subroutine, invoke additional subroutines or pages by way of return codes to the routing mechanism (error processing, rerouting of a request, pages by way of return codes to the routing mechanism (error processing, rerouting of a request, etc.) These pages may require a PIN or other user authentication, invoke a process external to CICS, use a variable style-sheet, and include button objects. The flexibility of this system provides other features too numerous to mention here.

The ability to generate subroutines from CICS-based page templates that can be attached to EAGLE easily and seamlessly is another advantageous feature of EAGLE.

The existence of one single CICS program that can marry file definition objects and page definition objects resulting in the creation of a Web page that allows reading, updating, adding, deleting and browsing of VSAM files is an extraordinarily advantageous feature of the present invention. The EAGLE interactive HTML generator is completely table-driven and is independent of the actual file and page definitions.

The EAGLE subroutines may be written in any CICS supported language.

Presently, and in contest to the present invention, the accessing of data on a mainframe from the Web is done using multi-tiered systems, most often, "screen-scraping". These systems routinely contain many different programming languages and require many different skill sets. These skill sets are often very different from the skill sets of the mainframe staff and require intense training and frequent use. Also, the multi-tiered systems require other computers to act as proxies for the mainframe, which adds a significant overhead cost. EAGLE cuts through these issues by operating on the mainframe using the language skills already possessed by the mainframe staff. EAGLE runs on the mainframe so that no extra machines are required for accessing the mainframe from the Web. This reduces the maintenance costs dramatically and reduces the number of points of failure as well. This methodology also cuts out the use of extra software products that not only add overhead to any transaction but also increase the complexity of the application and increase the difficulty of debugging errors.

Turning now to FIG. 2, a specific example of a Web page that may be generated by the present invention is shown. In this and the following the Web pages will be discussed in the context of a university, but it will be readily understood that the invention has applicability to other contexts. FIG. 2 is a menu page where various menu items are hypertext, meaning that a computer user at a computer 10 (FIG. 1) can click on (put mouse cursor at and press enter or press left mouse button) and thereby select one of the menu items. For example, clicking on GRADES, will allow a university student to access his or her grades.

Before allowing access to the grades, the identification Web page of FIG. 3 requires the student to enter a student identification number and personal identification number. Upon the student supplying this information, the Web server 12 (FIG. 1) passes it to mainframe 16. The mainframe 16 generates a state key and incorporates the state key into the next Web page (FIG. 4) displayed for the student. Specifically, the state key is randomly generated as a session key for this particular student. The state key is hidden on the Web page, meaning that a browser will not display it. However, when the student goes to another Web page restricted to that student (for example going from grades to transcripts), the manner of insertion of the state key on the Web page ensures that the browser program running on the computer 10 transmits the state key to the Web server 12. The Web server 12 in turn supplies the state key to the mainframe 16. Upon mainframe 16 confirming that the state key corresponds to the student in question, the transcript of the student can be accessed. Importantly, a part of EAGLE on the mainframe 16 disables a given state key if the state key is not received for a given time interval (timeout period). This reduces the chances that someone can readily access the private records of a student who steps away from his or her computer without remembering to close the program.

Other menu items of FIG. 2 may allow access to unrestricted information such as the course schedule for a coming semester. Such unrestricted information may be available without going through identification procedures or may require one to log in with a guest identification.

Turning now to the flowchart of FIGS. 5A and 5B (the latter being a continuation of FIG. 5A), the processing of a Web request for data will be discussed in detail. At block 20, a user at a computer 10 (refer momentarily back to FIG. 1) requests data from mainframe 16. The user's Web browser sends the request. At block 22, the Web server 12 formats the request such that mainframe 16 can respond. The mainframe 16 is running a CICS listener program such as supplied by IBM for use on its mainframes. At block 24, this passes control to CICS on the mainframe 16. Next, block 26 determines if the state key has been established and verified. If the particular data request requires a security, a screen such as FIG. 3 will prompt the user to enter information causing access authentication, and the association of access authentication to a state key. Next block 28 reads a primary function table to determine the functions required to supply the requested data.

The primary function table supplies the following:

program to execute, if applicable,

whether to LINK, XCTL, or START appropriate program,

files/tables called programs to be used,

page definition table to be used,

additional subroutines to call,

route code definitions,

additional data to be used with program,

set update flag (Y/N, meaning yes or no), PIN/Password protected page (Y/N) (some actions such as dropping a course may require reentry of PIN to increase protection against someone taking over when an authorized user has left without closing the Web browser program), and

call an external data source, if needed, supplies record key to table with all necessary information.

Block 30 then runs any program needed to respond to the request. If no program is called, block 32 simply formats a Web page and sends it back to the user via the Web server 12, which Web server may simply relay, without change, the Web page or may make minor insertions before supplying the Web page to the user. Block 32 puts together all the parts of the outgoing Web page including the page style, buttons, or other objects; the generated HTML, state key, and cache information. If XCTL or START is required, control goes to block 34 which then closes the connection.

If a LINK is made, a program on the mainframe is run Block 36 reads incoming data using page definition table. Further block 38 allows subroutines to determine whether to continue with this program at block 42 or at block 40 set a route code and return to the main routing routine. Data access uses one or more of the following methods: dynamic page definition and file definition tables, and fixed object module(s).

Block 44 updates files if appropriate and if data passes all edits. Block 46 formats data for display using one or a combination of the following methods: dynamic page definition and file definition tables, and fixed object module(s).

Block 48 reads route code. If none is set, control goes to block 50 such that HTML is sent to the Web server, which in turn sends a response to the Web browser on computer 10.

If the route code is set, block 52 interprets the route code, and via block 54, returns to main routing section at block 28.

With reference now to FIG. 6, more details of block 28 of FIG. 5A will be given. At block 56, a primary function table 58 is read.

(A primary function table is given as Appendix 1 attached; a primary Web page format is attached as Appendix 2; a Web page forms and styles is attached as Appendix 3; a data access, edits, and layout definition is attached as Appendix 4: and a Web page object is attached as Appendix 5. These give specific examples of particular features used in the preferred embodiment.)

Block 56 leads to block 60 which tests if the page being requested is a protected page (i.e., restricted access). If so, block 62 returns a function to block 56 to test if the user is authorized. If block 60 determines that the page is not protected, control goes to block 64 which determines if pre-function checks are needed. If yes, block 64 leads to blocks 66 and 68 which perform the checks and determine if the checks were passed. If so, the data appears proper and control goes to the continue at 70. If not, an error is noted at block 72.

Turning now to FIG. 7, a flowchart for driven Web page data access starts with block 74 which determines whether the page will use an object module. If yes, control goes to block 76 that provides Web page data access defined by the object module and leads to continue block 78. If no, a table driven process of data access at block 80 uses a primary Web page format 82, Web page objects 84, Web page forms and styles 86 and data access, edits, and layout definitions 88. Components 82 to 84 may be as shown on appendices 2 to 5.

FIG. 8 is a simplified example of how the present invention allows one, with proper authorization, to change a Web page in a recursive manner. The Web page 92 is displayed at a user□s computer connected to Web server 12 and mainframe computer 16. The user uses the web browser program on his or her computer to send a page change command to server 12 and mainframe 16. This page change command, causes the generation of a revised version of the original Web page, this being changed Web page 94. The revision may include different formating, style, data, etc., but will replace the old Web page 92. The page change command, as used herein, changes the appearance of the original Web page, meaning that it causes the Web page to appear differently to all who access it by causing it to display data from the computer storing the Web page. As used herein, "changes the appearance" or "changing the appearance" shall not include simply appending user comments or designs to a Web page as is common for Web-based bulletin board or public comment boards. By allowing recursive control (controlling a given Web page from that Web page being on a person□s browser, not on the person□s Web page editor program) of Web pages, the management of a large Web site can be quite efficiently performed.

Attached as appendices A, B, C, D, E, F, G, and H are copyrighted programs which run on a mainframe computer in a specific implementation of the invention. Attached as appendix J is a copyrighted program in C called Nirvana and which runs on the web server computer in a specific implementation of the invention. Certain non-critical information such as ports that are used on the actual implementation have been changed or left out to reduce exposure to unauthorized persons overcoming security measures in a specific implementation of the technique.

Although specific constructions have been presented herein, it is to be understood that these are for illustrative purposes only. Various modifications and adaptations will be apparent to those of skill in the art. In view of possible modifications, it will be appreciated that the scope of the present invention should be determined by reference to the claims appended hereto.

Appendix I --PRIMARY FUNCTION TABLE

```
NERCTST5             MIDAS MENU SYSTEM        MMS 10/19/98     14:01:16 $BO3
SELECT                                          DI6V
Topic                Description                Group.
MI-XCRIPT
 Topic        Topic
1             13.          COMADATA:          Auto?:           XCTL   To RAMIOROO
2             14           COMAMORE:          Auto?:           Link   To
3             15.          COMAMOR2:                 Start:
4             16.          DEFAULT                   GATA   MSYS
5             17.          Not Auth:                 Update?: N
6             18.          Not Open:                 Student: Y
7             19.          Invalid  :                Targ/Hdme:
8             20.          Return        :                  Not Available
9             21.          Process       :                  Phase(s) T
10.           22.          Choice        :           Check  Holds Y Owner  RA
11.           23.          Offuse        :           Check  PIN Y MI-PIN
12.           24.          Xctl to  :         Control
                                                            Cost     00000
Subroutines    File 1  CRDBI2                 Chain
1        5    File 2               Always Go        To     OK      ERR
2        6    File 3               Entry   Required:       Log?
3        7    File 4               Notfnd           C:Prog
4        8    File 5
                                                          PRT
4-©          1 Sess-2        128.227.75.2                 4/2
```

Appendix II -- PRIMARY WEB PAGE FORMAT

```
NERCTST5       MIDAS         TEKT INPUT         MTE 10/19/98 14:01:21 BO3
SELECT                       TOP 001      TOTAL LINES 008            DI6W
Topic          Description                Control          Dark Entry?
 MI-XCRIPT
Title:    FUN Transcript                  Owner: RA                           Text
style=isis
<! — MI-XCRIPT — >
<hr>
form=MI-GRADES               |
form=MI-MENU '
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FORM=MI-DECIDE
                                                          PRT
4-©           1 Sess-2        128.227.75.2                5/2
```

Appendix III -- WEB PAGE FORMS & STYLES

```
NERCTST5                M.Lus mn-*5E-eTs          MOB 10/19/98 14:01:24 $BO3
SELECT                         TOP 001      TOTAL LINES 009            DI6W
Topic          Description                  Control          Dark Entry?
MI-XCRIPT                                   FORM
Title:                               Owner: RA
                                                 Text
<!——MI-XCRIPT——>
<FORM METHOD="post" ACTION="/cgi-bin/cgiwrap/mlucas/nrvana">
<INPUT TYPE=hidden" NAME="MDASTRAN" VALUE="MI-XCRIPT">
STATEKEY
<INPUT TYPE="IMAGE" ALIGN="MIDDLE"
```

```
SRC="http://www.isis.ufl.edu/wfimages/button.gif"
NAME="Transcripts">
</form>
Transcripts


                                                                      PRT
4-©          1      Sess-2        128.227.75.2                        5/2"
```

Appendix IV -- DATA ACCESS, EDITS AND LAYOUT DEFINITIONS

```
NERCTST5            MIDAS MODULE GENERATOR        MID    10/19/98 14:32:21     $BO3
SELECT                                                         008 001 I7F
Program        Description      APPID        DelFld  Lins: 10  Max Segs: 146
RAMI0V00       MIDAS TEXT        MTEX        LINE   Qlins: 200  HedLen: 0449
Upd/Lst:       U C/M (CMB)  Fixed?   Log?:    LinLen: 100 SC-Offset: 0447
Typ (BSF):     SC Typ      Used?    Inseg?: 2   Limit: 100  SegLen: 0079
Blank Segs? Align:                      C           T           LV-Offset: 0000
                         Ed      Key H     o Base  Edits  y 0      B  D T Fld
Seq FLD        U M Out Ln Off  S H S I  Key  NR##? p Ln GR L  P B Off   Header
005 INPT       Y Y    10 000 H 1                   10    00  0  S 0001  MIDAS Text
010 DESC       Y Y    40    H                      40    00  0  D 0011 Description
015 CTRL       Y Y    10    H                        10    00  0  D 0051 Control
020 ----              Y      01    H                        01      00  0  E
025 TITL       Y Y    30    H                      30    00  0  S  0247  Title
030 ----              Y      01    H                      01      00  0 E
035 LINE       Y Y    79    S                      79    00  0 S 0000 =
040 ----         Y    01     S                     01    00  0 E


                                                                PRT
4-©          1 Sess-2       128.227.75.2                    4/2"
```

Appendix V -- WEB PAGE OBJECTS

```
NERCTST5            GATA TEXT            TXT  10/19/98 15:24:37 SBO3
SELECT                                                 KN
      GATA TEXT KEY
GEN-ADD-7

      TEXT
7. SECTION #### is a DUPLICATE of SECTION @@@@.
You must drop @@@@ before adding another section of this same course.
CALL SUBROUTINE SCHED



                                                       PRT
4-©        1  Sess-2        128.227.75.2               4/2"
```

Appendix A

```
TSO FOREGROUND   HARD
DSNAME RA-PATENT                                          (RAMIOOOO)

* RAMIOOOO TITLE 'READ FROM CICS TCPIP AND WRITE RECORDS TO A TD  QUEUE'
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SUBROUTINE RAMIOOOO
---------------
FUNCTION:
READ A TCPIP SOCKET STREAM ORIGINATED FROM A CLIENT
DETERMINE PROPER FUNCTION TO PERFORM
LINK OR XCTL TO APPROPRIATE PROGRAM TO PERFORM THAT FUNCTION
RESPOND TO CLIENT WITH THE RESULTS

            COPY       RARAMI1S
            COPY       RAMICOMM
            COPY       RARAMDAS
            COPY       RARAMMEN
            USING      RARAMMEN,R2

            COPY       RARATCPB
            USING      RARATCPB,R12

RAQUELEN    EQU   32000
            DSECT
RAQUEUE     DS    CL(RAQUELEN)
            COPY REGISTER DEFINITION
            COPY RARAREGS

DYNAMIC STORAGE
            DFHEISTG
            COPY RARASPAD
MIDASSTE    DS    CL8
PEEKFLAG    DS    F
TEMPMVAR    DS    F
TEMPMVLN    DS    F
OPTVAL      DS    OD
OPTVONOF    DS    F
OPTVLEN     DS    F
OPTLEN      DS    F
OPTNAME     DS    F
TIMEOUT     DS    OD
TIMEOUTS    DS    F
TIMEOUTM    DS    F
*SNDMASK    DS    D
*SNDMASK    DS    D
*SNDMASK    DS    D
*RETMASK    DS    D
*RETMASK    DS    D
*RETMASK    DS    D
RSNDMASK    DS    F
WSNDMASK    DS    F
ESNDMASK    DS    F
RRETMASK    DS    F
WRETMASK    DS    F
ERETMASK    DS    F
MAXSOC      DS    F
```

```
FLAGS       DS          F                  FLAGS FOR SOCKET CALLS
DS          OF
NAME        DS    CL16               SOCKET ADDRESS
NFAMILY     DS    H            TCP/IP ADDRESSING FAMILY
NPORT       DS    H            PORT DESCRIPTION
NADDRESS    DS          F                  IP ADDRESS
NDZERO      DS          XL8                RESERVED (MUST BE ZEROS)
CLNTHNOL    DS    H            SOCKET DESCRIPTOR OF CLIENT MACHINE
BUF         DS    CLIZO        BUFFER FOR SOCKET READ/WRITE
Ct4TLBUF    DS          CLI20        CONTROL BUFFER FOR SOCKET READ
PHASE       DS          C
PASSXCTL    DS    CL8
SAVETOPC    DS    CL10
DONETOPC    DS    CL10
IDENT       DS          OCL16
INITMVSA    DS          CL8
INITADSN    DS          CL8
PROCESS     DS          CL10
SAVEFICE    DS          CL6
TCPSVI4     DS          F
TOTLQLEN    DS          F
GOTONE      DS          C
FACTSREQ    DS    C
FACTWAIT    DS          C
SVNBYTES    DS    F            SAVE SIZE OF BUFFER FOR SOCKET READ
SAVER14R    DS          F            SAVE REG 14 FOR BAL

MAXITEMS    EQU   90
ITEMLEN     EQU   6
QUEADDRS    DS          CL           ((MAXITEMS)*(ITEMLEN))
EJECT
TITLE   'READ FROM CICS TCPIP AND WRITE RECORDS TO A TD QUEUE'
PROGRAM RAMI0000 STARTS HERE
RAMI0000     DFHEIENT CODEREG=(7,8)
RAMI0000     AMODE 31
RAMI0000     PMODE ANY

EXEC CICS HANDLE CONDITION DSIDERR(ERROR)                        x
ERROR(ERROR) TERMIDERR(ERROR) SYSIDERR(ERROR)                    x
ISCINVREQ(ERROR) INVRIQ(ERROR) IOERR(ERROR)                x
DISABLED(ERROR) ILLOGIC(ERROR) LENGERR(ERROR)              x
NOTAUTH(ERROR) NOSTG(ERROR)

EXEC CICS HANDLE CONDITION NOTFND(NOTFND) NOTOPEN(NOTOPEN)

EXEC CICS ASSIGN STARTCODE(CODE)
        CLC    CODE,=C'SD'
        BNE    RETURN

        MVC    CONSTANT.CL8'DFHEIST'    STORAGE LABEL
        MVC    PGRMNAM,=CL8'RAM10000'    PROGRAM NAME

RECIEVE INPUT FROM CICS TCPIP LISTENER



        A000   EQU     *
        MVC    TCPINLEN.=AL2(TCPIN$)
EXEC    CICS RETRIEVE INTO(TCPINPUT) LENGTH(TCPINLEN)            x
NONANDLE
```

```
         CLC     TCPINLEN,=AL2(TCPIN$)      COMPARE LENGTH
         BNE     PROGERR              BAD COMMAREA

         MVC     SAVENOPE,BLANKS

DOTEST MVC      DATAAREA, DATAAREA

GET MAIN STORAGE FOR COMMAREA AND RAMDAS FILE

         SR      R14,R14            CLEAR REG
         LA      R14,COMAHDRL            GET CO"IAREA LENGTH
         AH      R14,=H'500' CHANGE THIS ONE ONLY
         STH     R14,COMLTH
         SR      R14-R:L4                   CLEAR REG
         LA      R14-MDASL                  GET LENGTH FOR TOP OF MDAS
         AH      R14,COMLTH         ADD TO GET TOTAL NEEDED
         XC      RETCODE,RETCODE    CLEAR RETURN CODE
         XC      BUF,BUF            CLEAR AREA
         LA      R6,BUF             ADDRESS OF AREA
         BAL     R14,GETRESPA               GET MESSAGE
*
         L       R14,RETCODE
         BCTR    R14,0
         LTR     R14,RI4
         BM      NODATA
         EX      R14-BUFBLANK       COMPARE TO BLANKS
         BH      ERROR
*
NODATA         EQU   *
               BAL   R14,SENDSEND
               BAL   R14,READSKT
*
               CLI   FACTSREQ,C'Y'
               BE         TESTAREA
               CLC   DATAAREA(4),C'TEST'
               BNE   NOTTEST
TESTAREA       EQU   *
               MVC   DATAAREA,DATAAREA
*
       CHECK TO.SEE IF THIS IS A CALL FOR INFORMATION ONLY
*
NOTTEST        EQU   *
STATEMGT       EQU   *
             EXEC CICS LINK PROGRAM 'RAM 0300' ) COMMAREA(RARAMDAS)       x
                     LENGTH(CMLENGTH)
               BE         CHKWAIT            YES, CHECK TO SEE CLIENT IS WAITING.
               CLI   COMAPROF,C'P'      IS THIS A RESPONSE TO A REQUEST?
               BE         FACTCLOS           YES, RESPOND & CLOSE
*
*
               CLC   COMAMESS(6),C'VERIFY'     BLANK
               BNE   READ2ND
*
               CLC   COMATOPL,COMATOPC
               BE         CHECKEM
NORESOUR       MVC   COMATOPC(10),C'MI-NORESRC'
               B          READ2ND
*
*              CLC   BUF(9),C'CLOSE'      CLOSE?      COMMENTED OUT
*               BNE    SOCKERR                NO, ERROR  ERROR, OK
**
                MVC    SOCFUNC,CLI6'CLOSE              SOCKET FUNCTION  =  CLOSE
                CALL   EZASOKET,(SOCFUNC,CLNTHNDL,                         X
                ERRNO,RETCODE),                                      X
                VL,MF(E,PARMLIST)
*
                CLI    FACTSREQ,C'Y'        IS THIS AN INITIAL OUTSIDE REQUEST?
                BE            READ2ND           YES, PROCESS REQUEST
*
*
                MVC    TEMPMVLN,COMAMVLN        SAVE WRITE LENGTH


                MVC    COMAQADD,COMAMVAR        SET WRITE FROM ADDRESS
PQUELOOP        EQU    *
                MVC    COMAQLEN,TEMPMVLN+2      SET WRITE LENGTH
                B             PQUELOOP                GO WRITE ANOTHER QUEUE
*
ENDQLOOP        EQU    *
               EXEC CICS DEQ RESOURCE(COMAPQNM) LENGTH(8)
*
*               BE            MOVETARG                YES, MOVE TARGET
*               MVC    SAVEFICE,COMAFICE        SAVE FICE IN COMMAREA
*               CLC    COMAFIC1,BLANKS          IS THERE A FICE CODE?
NOQUE           MVC    COMAPQNM,COMAMQNM
                MVI    COMAPQNM,C'='
*              EXEC CICS LINK PROGRAM(COMAPROG) COMMAREA(COMMAREA)  X
*                      LENGTH(COMACOML)
                B      PROGLINK


READMEN         EQU
                MVC    DONETOPC,COTIATOPC
EXEC  CICS READ DATASET('RAMMEN') SET(RZ) LENGTH(HALFWORD)  X
RIDFLD(COMATOPC)
          MVC    COMAOFLI,MMENOFL1
          MVC    COMAMLDS,MMENNAME
          MVC    COMAS003,MMENS003
          MVC    COMAS004.MMENS004
          MVC    COMAS005,MMENS005
          MVC    COMAS006,MMENS006
          MVC    COMAS007.MMENS007
          MVC    COMAS008,MMENS008

          BR     R4

VERIFYEQU  *
          CLI    MMENPASS,C'Y'
          BNE    CKHOLDS
          MVC    COMAVERI,MMENPKEY

          B      READ2ND


          MVC    COMAIBFN,BLANKS
          MVC    COMACOLR,BLANKS
EXEC  CICS LINK PROGRAM(COMAPROG.) COMIMAREA(COMMAREA)    X
          LENGTH(COMACOML)
```

```
IF THIS IS PROCESSING A WAITING REQUEST, FACTWAIT=Y, FACTSREQ=Y
       USE2       PACK   DOUBLE,COMAIBFN(2)
       DECR       SP     DOUBLE,*P'1'
       CVB    R1,DOUBLE
       MH     RI,*H,'10'
       AR     R14,R1
       CLC    0(10,R14), BLANKS

SENDSEND EQU

       ST     R14,SPADSV14
       A010       EQU  *
       L      R14.,SPADSVI4
       BR     R14
       READSKT EQU

       ST     R14,SPADSVI4

READ RECORD FROM TCPIP SOCKET
       CLC    RETCOD,=F'0'         ANYMORE BYTES
       BE     SOCKERR              TCP/IP ERROR NO, GO CLOSE SOCKET
CHECK DIFFERENCE BETWEEN WHAT WAS EXPECTED AND WHAT WAS RECEIVED
       L      R14,NBYTES           LOAD EXPECTED LENGTH
       S      R14,RETCODE          GET DIFFERENCE
       LTR    R14,R14              TEST REGISTER
MOVENUM       MVZ   NUMBCHECK(*-),WKLEN        CHECK TO SEE IF NUMERIC
CHKNUM        CLC   NUMCHECK(*-*),NUMZONE      CHECK TO SEE IF NUMERIC
A21           EQU   *
              MVC   NBYTES,=A(L'WKLEN) LENGTH OF AREA
       L      R14,NBYTES
       BCTR   R14,0
       LTR    R14,R14
PUTRQST       MVI   FACTSREQ,C'Y               MARK AS REQUEST AND
              MVC   SOCKFUNC,=CL16'RECV'       SOCKET FUNCTION = READ
              MVC   PEEKFLAG,=F'0'             SET TO PEEK AT DATA
              LH  R14,=H'10'
    A025      EQU  *
              STH   R14.RECCOL.,. SAVE RECV COUNTER
              CALL  EZASOKET,(SOCFUNC,CLNTHNDL PEEKFLAG,
      x
              BNP   SOCKERR             IF NOT POSITIVE, ERROR
              ST    R1,NBYTES            NUMBER OF BYTES NEEDED
              B     A025

        WAIT FOR CLIENT TO RESPOND

    DORECVL .  EQU  *
           XC       RSNDMASK,RSNDMASK       INIT FIELDS
           XC      WSNDMASK,WSNDMASK        "
                   RRETMASK,WRETMASK,ERETMASK,
     x
                         ERRNOPRETCODE),
                   x
                   VL,MF=(E,PARMLIST)
           L             RI,RETCODE
           C       RL,=F'0'             POSITIVE RETURN CODE
           BL      SOCKERR              NO. MUST BE AN ERROR
           LH      R14,RECCOUNT           RESTORE LOOP COUNTER
           BCT     R14,AO25             GO ASK FOR MORE
           B       SOCKERR                    LOOPED MAX TIMES, ERROR
```

```
         B020    EQU  *

         B    READTEXT

         NOTOPEN     EQU  *
         CLC  SAVENOPE,BLANKS
         BH   PUTNOPE
         MVC  CCMATOPC(10),=C'NOTOPEN  '
         B   READTEXT
 PUTNOPE       MVC  COMATOPC,SAVENOPE
               B    READTEXT

 SOCKERR        EQU  *
                MVC  COMATOPC(10),=C'SOCKERR  '
                B    READTEXT

 NOTFNDT        EQU  *
                B    ERROR

 NOTFND         EQU  *
                CLC  COMAREGN,BLANKS
                BH   PUTNOTF
                MVC  COMATOPC(10),=C'NOTFOUND '
                B    READTEXT
 PUTNOTF        MVC  COMATOPC,COMAREGN
                B    READTEXT

 PROGERR        EQU  *
                MVC  COMATOPC(10),=C'PROGERR  '
                BE   ERROR2              NO, GO TO ERROR

 READQ          EQU  *
 CLI  COMAPROF,C'S' FACTS RESPONSE
                BNE  NOPROC

 EXEC CICS LINK PROGRAM('RAMIIS00') COMMAREA(COMMAREA)                  x
                LENGTH(COMACOML)
          LA   R0,* MOVE NULLS TO AREA
          LA   R14,QUEADDRS
                SR   R1,R1
                L  15,=A(L'QUEADDRS)
                MVCL  R14,R0

            XC   TOTLQLEN,TOTLQLEN
    READQAGN     EQU  *
                EXEC  CICS LINK PROGRAM('RARASOKY') COMMAREA(COMMAREA)
      x
                LENGTH(COMACOML)
                LH  R14,COMAQITE          LOAD CURRENT ITEM NUMBER
 MVC    SOCFUNC,=C  'SELECT' SOCKET FUNCTION      =SELECT|
 CALL  EZASOKET,(SOCFUNC,MAXsoc,TIMEOUT,
 BE   GETRBCK   NO, GO BACK
 CALL  EZACICO5,(BUF,NBYTES),VL,MF=(E,PARMLIST)  TRAN 2 EBCDIC
 GETRBCK  EQU
 RETURN  EQU
 EXEC  CICS  RETURN
 EJECT
 TITLE  'ABENDS'
 COPY  RAMIGETP
 QUEUEERR  EQU
 MVC ABCODE+2,=C'QU'      INITIAL TSQUE READ ERROR
```

```
MVC BUF,MSGZOOB          ERROR MESSAGE FOR CLIENT
MVC NBYTES,=A(L'MSGZOOB)          LENGTH OF ERROR MESSAGE
B  ZOO                            ABEND
PROGERR  EQU
mvc   ABCODE+2,=C'PR'     PROGRAM LOGIC ERROR
MVC   BUF,MSGZOOL         ERROR MESSAGE FOR CLIENT
MVC   NBYTES,=A(L MSGZOOL)  LENGTH OF ERROR MESSAGE
B     ZOO           ABEND
SOCKERRB EQU
MVC   ABCODE+2,=C'SO      TCP/IP SOCKET ERROR
MVC   BUFMSGZOOS          ERROR MESSAGE FOR CLIENT
MVC   NBYTES,=A(LMSGZOOE)  LENGTH OF ERROR MESSAGE
B     ZOO           ABEND
NOTFNDT  EQU
MVC    ABCODE+2,=C'TX'    TCP/IP SOCKET ERROR
MVC   BUF, MSGZOOT        ERROR MESSAGE FOR CLIENT
MVC   NBYTES,=A)L'MSGZOOT"      LENGTH OF ERROR MESSAGE
B      ZOOO  ABEND
NOTFND       EQU
MVC   ABCODE+2,=C'NF'     RECORD NOT FOUND
MVC   BUF,MSGZOON         ERROR MESSAGE FOR CLINT
MVC   NBYTES,=A(L'MSGZOON)      LENGTH OF ERROR MESSAGE
B     ZOOO  ABEND
ZOOO  EQU
B     ZO10
ST    R14,ABR14     SAVE LAST RETURN ADDRESS
USING DFHEIBLK,R14 SET EIB DSECT BASE
L     R14,DFHEIBP  LOAD EIB ADDRESS
MVC   ABRESP,EIBRESP    SAVE LAST RESPONSE CODE
DROP  R14     DROP EIB DSECT BASE
MVC   ABCODE (2),PGRMNAM+4      SET UP ABEND CODE
EXEC  CICS DUMP
      DUMPCODE(ABCODE)
            PROGRAM STORAGE TASK TERMINAL
                  SPACE 2
                  SEND ERROR MESSAGE TO THE CLIENT MACHINE
Z010   EQU
       MVC   SOCFUNC,=CL16'SEND'        SOCKET FUNCTION=SEND
       MVC   FLAGS,=F'0'   CLEAR FLAGS VARIABLE
       CALL  EZACIC04,(BUF,NBYTES),VL,MF=(E,PARMLIST) TRANS. TO ASCII
       SPACE
       CALL  EZASOKET,(SOCFUNC,CLNTHNDL,FLAGS,
       NBYTES,BUF,ERRNO,RETCODE),
       VL,MF=(E,PARMLIST)
       SPACE 2
       B     EZACLOSE     GO CLOSE TCPIP SOCKET AND EXIT
       SPACE 2
       TITLE  'CONSTANTS AND LITERALS'
             DS OF
       PACKONE     DC     PL4'1'  PACKED DECIMAL ONE
       BLANK       DC     X'40'

       BLANKS      DC     CL120'
       ZEROS       DC     CL30'0'
       CKTR        TR     COMATOPC(*-*),UPCASE      TRANSLATE TO UPPER CASER
       CASE
       UPCASE      DC     X'000102030405060708090A0B0C0D0E0F'
                   DC     X'101112131415161718191A1B1C1D1E1F'
                   DC     X'202122232425262728292A2B2C2D2E2F'
                   DC     X'303132333435363738393A3B3C3D3E3F'
                   DC     X'404142434445464748494A4B4C4D4E4F'
                  DC    X'505152535455565758595A5B5C5D5E5F'
                  DC    X'606162636465666768696A6B6C6D6E6F'
                  DC    X'707172737475767778797A7B7C7D7E7F'
                  DC    X'80C1C2C3C4C5C6C7C8C9A88B8C8D8E8F'
                  DC    X'90D1D2D3D4D5D6D7D8D99A9B9C9D9E9F'
                  DC    X'A0A1E2E3E4E5E6E7E8E9AAABACADAEAF'
                  DC    X'B0B1B2B3B4B5B6B7B8B9ABBBBCBDBEBF'
                  DC    X'C0C1C2C3C4C5C6C7C8C9CACBCCCDCECF'
                  DC    X'D0D1D2D3D4D5D6D7D8D9DADBDCDDDEDF'
                  DC    X'E0E1E2E3E4E5E6E7E8E9EAEBECEDEEEF'
                  DC    X'F0F1F2F3F4F5F6F7F8F9FAFBFCFDFEFF'
                  DS    OH
UQUEFX            DC    CL2'LD'TD QUEUE PREFIX
MAX_SECONDS             DC      F'0000000'
FIONBIO           DC    XL4'8004A77E'
SO_REUSEADDR            DC      F'00000004'
SO_KEEPALIVE            DC      F'00000008'
SO_BROADCAST            DC      F'00000032'
SO_LINGER               DC      F'00000128'
SO_SNDBUF               DC      F'00004097'
SO_ERROR                DC      F'00004103'
SO_TYPE                 DC      F'00004104'
NUMZONE           DC    CL28'0000000000000000000000000000'
MAXWRK                  DC      F'32767'        MAXIMUM RECORD LENGTH
MAXRLEN                 DC      H'32717'        MAXIMUM RECORD LENGTH
MAXTIMES          DC    H'10'                   MAXIMUM SENDS
FILEMSG           DC    C'OKTOSEND' MESSAGE TO START SENDING DATA
OKMSG             DC    C'GOTFILEOK'            SUCCESSFUL MESSAGE
RECOKMSG          DC    CL9'GOTDATAOK'          SUCCESSFUL RECORD MESSAGE
WAITMSG           DC    C'WITING FOR RESOURCES ON MAINFRAME...'WAIT MESSAGE
MSGZ00A           DC    C'ERROR: COMMAREA LENGTH ERROR'
MSGZ00B           DC    C'ERROR:     TSQUE READ ERROR'
MSGZ00C           DC    C'ERROR:     CFTR TSQUE READ ERROR'
MSGZ00D           DC    C'ERROR:     LDL115P (EBCDIC->ASCII) ERROR'
MSGZ00E           DC    C'ERROR:     CICS ERROR'
MSGZOOF           DC    C'ERROR:     ONILOG VSAM WRITE ERROR'
MSGZ00G           DC    C'ERROR:     TSQUE WRITE ERROR'
MSGZ00H           DC    C'ERROR:     TRANSIENT DATA QUE ENQ PROBLEM'
MSGZ00L           DC    C'ERROR:     PROGRAM LOGI ERROR'
MSGZ00N           DC    C'ERROR:     MMEN ENTRY NOT FOUND
MSGZ00T           DC    C'ERROR:     YOUR SESSION HAS TIMED OUT'
MSGZ00O           DC    C'ERROR:     MMEN FILE NOT OPEN'
MSGZ00P           DC    C'ERROR:     BAD RECORD LENGTH'
MSGZ00S           DC    C'ERROR:     TCP/IP SOCKET ERROR'
MSGEND            EQU
                  LTORG
                  END   RAMI0000


CLC   RETCODE,=F''0'      ANYMORE BYTES
BE    SOCKERR             TCP/IP ERROR NO, GO CLOSE SOCKET

CHECK DIFFERENCE BETKEEN WHAT WAS EXPECTED AND WHAT WAS REC'VD

L      R14,NBYTES       LOAD EXPECTED LENGTH
S      R14,RETCODE      GET DIFFERENCE
LTR   R14,RI4           TEST REGISTER
MOVENUM MVZ NUMCHECK(*-*),WKLEN CHECK TO SEE IF NUMERIC
CHKNUM  CLC   NUMCHECK(*-*),NUMZONE CHECK TO SEE IF NUMERIC

A021        EQU   *
```

```
MVC   NBYTES.=A(L'WKLEN)    LENGTH OF AREA
L     R14,NBYTES
BCTR  R14,0
LTR   R14,R14

PUTRQST  MVI    FACTSREQ,C'Y'          MARK AS REQUEST AND
*
MVC   SOCFUNC,=CL16 'RECV'    SOCKET FUNCTION = READ
MVC   PEEKFLAG,=F'0'           SET TO PEEK AT DATA
```

APPENDIX B

```
        TSO FOREGROUND HARDCOPY
        DSNAME=RA.PATENT          (RAMI0100)
        DATA SET RAMI0100
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        PROTOCOLS, ARE COPYRIGHT 1998 BY THE UNIVERSITY OF FLORIDA, ALL RIGHTS
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SUBROUTIN RAMI0100
FUNCTION:
ROAD, COMPRESS AN INCOMMING DATABLOCK.
ADD ADITIONAL FORMATIING AS DEFINED BY MTEX RECORD
WRITE NECESSARY TS QUEUES
1.      RAMI0100     FILE RECORD SECT
        COPY         RAMICOMM            SUBROUTIN COMMAREA
        USING        COMMAREA,RS
        COPY         RARAMMEN            SUBROUTINE COMMAREA
        USING        RARAMMEN,R9
        COPY         RARAMSTY            SUBROUTINE COMMAREA
        COPY         RARAMTEX            SUBROUTINE COMMAREA
        USING        RARAMTEX,R7
        USING        MTEXS,R2
MAXAREA              EQU    32767
DATAAREA             DSECT
2.      WORKING STORAGE
        COPY DFHAID               3270 AID CHARACTERS
        SPACE
        COPY RARAREGS             REGISTER EQUATES
        EJECT
DFHEIST DSECT                     COMMAREA DSECT
        SCRATCH PAD AREA
DOUBLE      DS     D
FWORD              DS     F
SAVEQADD    DS     F
SAVER12     DS     F
DATAQADD    DS     F
DATAQLEN    DS     H
KEEPQADD    DS     F
KEEPQLEN    DS     H
SAVEQLEN    DS     H
HALFWORD    DS     H
SAVEMAX     DS     H
QREWRT      DS     C
READTEXT    DS     C
NEEDPRE     DS     C
GOTNIRV     DS     C
BEENHERE    DS     C
REGID       DS     CL4
SPADSKEY    DS     CL30
STYLTYPE    DS     C
BALWRITE    DS     C
AFTHEAD     DS     C
            EJECT
PROGRAM RAMI100 STARTS HERE
RAMI0100    DFHEIENT     CODEREG=(3,8), DATAREG=(13)
RAMI0100    AMODE 31
RAMI0100    RMODE ANY
            SPACE
            CLC    EIBCALEN,=H'0'
```

```
                 BE      RETURN
                 L       R5,DFHEICAP          GET COMMAREA
                 SPACE
          EXEC CICS HANDLE CONDITION DSIDERR(ERROR)
                         ERROR (ERROR) TERMIDERR(ERROR) SYSIDERR(ERROR)
                         ISCINVREQ(ERROR) INVREQERROR) IOERR(ERROR)
                         DISABLED(ERROR) ILLOGIC(ERROR) LENGERR(ERROR)
                         NOTAUTH(ERROR)
 EXEC CICS HANDLE CONDITION NOTFND(NOTFND) NOTOPEN(NOTOPEN)
 DEBUGDEBUGDEBUGDEBUG
                 CLC     COMATOPC(10),=C'XXXXXXXXXXXX'
                 BNE     AFTDBUG1
 DEBUG1          B       AFTDBUG1
 AFTDBUG1        EQU
 DEBUGDEBUGDEBUGDEBUG
 FIRST  EQU
                 CLI     COMAPROF,C'S'
                 BE      AFTFIRST
                 MVC     COMAQITE,=H'1'
                 MVC     COMAQ2DO,=C'DELETE      '     SET TO DELETE QUEUE
                 MVC     COMAQKEY,COMAMQNM                  SET TS QUEUE NAME
                 EXEC CICS LINK PROGRAM('RARASOKY') COMMAREA(COMMAREA)
                         LENGTH(COMACOML)
 AFTFIRST        EQU
                 USING MTEX,R2
                 CLC     MTEXLINE(5),=C'STYLE'
                 BE      MTEXLOOP
                 CLC     MTEXLINE(5),=C'STYLE'
                 BE      MTEXLOOP
                 CLC     MTEXLINE(4),=C'FORM'
                 BE      MTEXLOOP
                 CLC     MTEXLINE(5),=C'<BODY'
                               //www.isis.ufl.edu/wfimages/logo2.gif"></td><h3>'
                 MVC     95(50,R12),MTEXNAME
                 MVC     145(27,R12),=C'</h3></td></tr></table><hr>'
                 MVI     172(R12),X'25'
                 MVC     173(05,R12),=C'<PRE>'
                 MVI     178(R12),X'25'
                 LA      R12,179(R12)
                 MVI     NEEDPRE,C'Y'
                 CLC     MTEXLINE(4),=C'FORM'
                 BE      MTEXFORM
                 CLC     MTEXLINE(10),=C'##########'
                 BNE     NOTDATA
                 CLI     COMAMI01,C'Y'
                 BE      AFTDATA
                 SR      R15,R15
                 LH      R1,DATAQLEN
                 LR      R14,R12
                 LR      R15,R1
                 MVCL    R14,R0
                 AH      R12,DATAQLEN
                 ST      R12,SAVER12
                 MVC     COMAQADD,r  QADD
 AFTDATA         LA      R2,MTEXLEN(R2)
                 BCT     R6,MTEXLOOP
                 B       AFTERTEX
 NOTDATA         EQU
                 CLC     MTEXLINE(08),=C'MDASTRAN'
                 BNE     NOTTRAN
                 CLC     COMATOPC,BLANKS
```

```
               BNH    BCTMTEX
               MVC    0(79,R12),MDASTRAN
               MVC    0(79,R12),CACHLINE
               MVC    44(8,R12),COMAMQNM
               MVI    79(R12), X'25'
               B      BCTMTEX
NOTNIR         EQU
               MVC    0(79,R12), MTEXLINE
               MVI    79(R12),X'25'
BCTMTEX        EQU
               LA     R2,MTEXSLEN(R2)
STYLE          EQU
               EXEC   CICS HANDLE CONDITION NOTFND(NOTSY)NOTOPEN(NOSTY)
                      DISABLED(NOSTY)
               LA     R14,9
               EX     R14,CKTR
               B      TITOVER
TITBCTLA       R15,1(R15)
               BCT    R1,TITLOOP
TITOVER        EQU
NOSUBS         EQU
               CLC    MSTYLINE(8),=C'MDASTRAN'
               BNE    CKNIRV
               CLC    COMATOPC,BLANKS
               BNH    BCTMSTY
               MVC    0(79,R12), MDASTRAN
               MVC    0(79,R12),CACHLINE
               MVC    44(8,R12),COMMAMQNM
               MVI    79(R12),X'25'
               B      BCTMSTY
NOTNIRV        EQU
CKBUTT         CLC    MSTYLINE(7),=C'MBUTTON'
               BNE    NOTMBUTT
               MVC    0(41,R12),-C'gif">  <input type="hidden" names ="MDASTRAN" '
               MVC    41(27,R12),=C' value="XX-        "></form>'
               MVC    49(10,R12),SPADSKEY
               MVI    68(R12),X'15'
               LA     R12,80(R12)
               B      BCTMSTY
NOTMBUTT       EQU
               SR     R14,R15
               STH    R14,COMAQLEN
               BAL    R4,COMPRESS          GO AND COMPRESS THE AREA
AFTTEXT        EQU
               L      R14,COMAQADD
               AH     R14,COMAQLEN
               MVC    COMAQADD,SAVEQADD
COMPRESS       EQU    THIS CODE REMOVES THE EXTRA BLANKS
               LH     R15,COMAQLEN
               LTR    R15,R15
               BZ     NOAREA
               BNP    ERROR
               L      R14,COMAQADD
COMPLOOP       EQU
               CLI    0(R14),X'00'
               A      R0,=F'100
                      TEST15
NOTFND         EQU
               CLI    BEENHERE,
NOTOPEN        EQU
ERORR                 EQU
```

```
                MVI    COMAERRF,C'Y'
                CLI    COMACONT,C'Y'
                BE     MOVEMI01
                MVI    COMAMI01,C' '
                B      CLRCONT
MOVEMI01        MVI    COMAMI01,C'Y'
CLRCONT         MVI    COMACONT,C' '
         DEBUGDEBUGDEBUGDEBUG
                CLC    COMATOPC(10),=C'XXXXXXXXX'
                BNE    AFTDBUG3
DEBUG3          B      AFTDBUG3
AFTDBUG3        EQU
         DEBUGDEBUGDEBUGDEBUG
                MVC    COMAQADD,KEEPQADD
                MVC    COMAQLEN,KEEPQLEN
RETURN          EQU
                EXEC   CICS RETURN
                CONSTANTS AND LITERALS
BLANKS          DC     CL120' '
CKTR            TR     SPADSKEY(*-),UPCASE        TRANSLATE TO UPPER CASE
UPCASE          DC     X'000102030405060708090A0B0C0D0E0F'
                DC     X'101112131415161718191A1B1C1D1E1F'
                DC     X'202122232425262728292A2B2C2D2E2F'
                DC     X'303132333435363738393A3B3C3D3E3F'
                DC     X'404142434445464748494A4B4C4D4E4F'
                DC     X'505152535455565758595A5B5C5D5E5F'
                DC     X'606162636465666768696A6B6C6D6E6F'
                DC     X'707172737475767778797A7B7C7D7E7F'
                DC     X'80C1C2C3C4C5C6C7C8C98A8B8C8D8E8F'
                DC     X'90D1D2D3D4D5D6D7D8D99A9B9C9D9E9F'
                DC     X'A0A1E2E3E4E5E6E7E8E9AAABACADAEAF'
                DC     X'B0B1B2B3B4B5B6B7B8B9BABBBCBDBEBF'
                DC     X'C0C1C2C3C4C5C6C7C8C9CACBCCCDCECF'
                DC     X'D0D1D2D3D4D5D6D7D8D9DADBDCDDDEDF'
                DC     X'E0E1E2E3E4E5E6E7E8E9EAEBECEDEEEF'
                DC     X'F0F1F2F3F4F5F6F7F8F9FAFBFCFDFEFF'
                DS     OH
MDASTRAN        DC     CL79'<INPUT TYPE="hidden" NAME="MDASTRAN" VALUE="#####X
                       ###">
STTELINE        DC     CL79'<INPUT TYPE="hidden" NAME="MDASSTTE" VALUE="
CACHLINE        DC     CL79'<INPUT TYPE="hidden" NAME="MDASCACH" VALUE="
NEXTLINE        DC     CL79'<INPUT TYPE="hidden" NAME="MDASNEXT" VALUE="Y">'
PREVLINE        DC     CL79'<INPUT TYPE="hidden" NAME="MDASPREV" VALUE="Y">'
                LTORG
                       END    RAMI0100
```

APPENDIX C

```
                    TSO FOREGROUND HARDCOPY
DSNAME=RA.PATENT                                        (RAMI1B00)
                    PROGRAM RAMI1B00

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                    SUBROUTINE RAMI1B00
                    FUNCTION:
                    RETRIEVE SPECIFIED DATA FROM TCP/IP REQUEST
                    DO NECESSARY DATA FORMATTING
                    RETURN RESULTS TO CALLING PROGRAM














                    SASS MENU INTERFACE


                    COPY RACL0001
                    COPY RARAREGS


COMMAREA STARTS HERE BASE REG IS R5
COPY RAMICOMM            COPY COMMAREA DSCET
USING COMMAREA,R5

FILE DESECT STARTS HERE  BASE REG IS R9

QLINES        EQU   100
QLINELEN      EQU   140
TSL           EQU   5

              USING COMMAREA,R5

              WORKING STORAGE

DFHEISTG DSECT                  COMMAREA DSECT

              SCRATCH PAD AREA

FINDFLDT      DS    CL256
DOUBLE3       DS    D
              DS    OD
              DS    F
ANSWER        DC    F'0'
DIVIDEND      DS    OD
```

```
QUOTIENT    DS    F
REMAINS     DS    F
DIVISOR     DS    F
MESS        DS    CL79
THISSEG     DS    PL3
CHAR9       DS    CL9
FLDLEN      DS    F
SV01        DS    F
SV014       DS    F
SV015       DS    F
SAVE6       DS    F
DEC01       DS    F
DEC14       DS    F
DEC15       DS    F
SIGDIGDS    F
FOUNDIT     DS    C
GOTDEC      DC    C
GOTSIG      DS    C

            COPY  RARASPAD

            PROGRAM RAMI1B00 STARTS HERE
RAMI1B00    DFHEIENT     CODEREG=(3,8,7),DATARAEG=(13)
RAMI1B00    AMODE 31
RAMI1B00    RMODE ANY

            CLC   EIBCALEN,=H'0'
            BE    RETURN

            EXEC CICS HANDLE CONDITION ERROR(ERROR)
            L     R5,DFHEICAP

GETDATA     EQU
            BE    BCTLLOOP
            CP    COMAUSEG,=P'0'
            BE    BCTLLOOP
            CLC   14(8,R6),=C'MDASSEGN'
            BNE   BCTLLOOP

            PACK  THISSEG,22(3R6)

            CP    COMAUSEG,THISSEG
            BNE   NOTSEG1

            MVI   FOUNDIT,C'Y'
            B     BCTLLOOP           NOT THERE, BUMP A BYTE
NOTSEG1     MVI   FOUNDIT,C'N'
            B     BCTLLOOP           NOT THERE, BUMP A BYTE

SAVR6 ST    R6,SAVE6

            CLI   FOUNDIT,C'Y'
            BNE   BCTLLOOP
            CLI   COMADECP,C'0'      ANY DECIMAL PLACES?
            BNH   QUEMATCH           NO, SKIP

            ST    R1,DEC01           SAVE
            ST    R14,DEC14                REGS
            ST    R15,DEC15

PACK   DOUBLE2,COMADECPPUT DEC PLACES IN DOUBLE?
```

```
               CLC    COMAOLEN,NUMZONE        LENGTH                       00620000
               BE     DECEND                            OK?                00630000
               MVZ    NUMCHECK(2),COMAOLEN                                 00640000
               CLC    NUMCHECK(2),NUMZONE                                  00650003
               BNE    DECEND              NO, DONE                         00660000
               PACK   DOUBLE,COMAOLEN     PUT LENGTH IN DOUBLE             00670003
                                                                           00680000
                                                                           00690000
                                                                           00700003
CP             DOUBLE,DOUBLE2 DEC PLACES BIGGER THAN LENGTH                00710000
               BH     LOK                                                  00720000
               MVI    COMASERR,C'Y'                                        00730000
               B      SAYERROR     ERROR                                   00731000
                                                                           00732000
LOK            ZAP    SIGDIG,DOUBLE GET NUMBER OF                          00733000
               SP     SIGDIG,DOUBLE2 SIG NUMERIC DIGITS                    00734000
                                                                           00735000
               CVB    R1,DOUBLE      PUT DEC PL IN R1                      00736000
               ZAP    FWORD,=P'0'    ZERO COUNTER                          00737000
               LR     R14,R1         GET DEC PL                            00738000
               BCTR   R14,0          SUB FOR EX                            00739000
               EX     R14,MOVECH16          MOVE ZONES                     00740000
               ZAP    DOUBLE3,FWORD         GET INPUT COUNTER              00740100
               CVB    R1,DOUBLE3                                           00744800
               BNP    FDOK                                                 00744900
FDZON          CLI    0(R15),C' '                                          00745000
               BE     FDBCT                                                00745100
               CLI    0(R15),C'0'                                          00745200
               BL     FDERR                                                00745300
FDBCT          LA     R15,1(R15,)                                          00745400
               BCT    R1,FDZON                                             00745500
               B      FDOK                                                 00745600
FDERR          MVI    COMASERR,C'Y'                                        00745700
               B      SAYERROR                                             00745800
FDOK           CVB    R1,DOUBLE      FIND                                  00745900
               AR.    R14,R1                DECIMAL                        00746000
               CVB    R1,DOUBLE2                     POINT                 00746100
               SR     R14,R1                                  AREA         00746200
               BCTR   R14,0                                                00746300
                                                                           00746400
                                                                           00746500
                                                                           00746600
               LA     R15,22(R6)     POINT TO INPUT                        00746701
CP       FWORD,SIGDIG          INPUT MORE THAN SIG NUMERIC?                00746800
               BNH    USEFW          NO USE INPUT COUNTER                  00746900
               ZAP    DOUBLE3,SIGDIG        GET SIG DIGITS                 00747000
               B      GOTSD                 GO ON                          00747100
USEFW          ZAP    DOUBLE3,FWORD         GET INPUT COUNTER              00747200
GOTSD          CVB    R1,DOUBLE3            POINT                          00747300
               AR     R15,R1                TO LAST BYTE                   00747400
               BCTR   R15,0          OF INPUT DATA                         00747500
                                                                           00747600
               CVB    R1,DOUBLE      GET PLEN                              00747700
               CVB    R0,DOUBLE2     GET DEC PTS                           00747800
               SR     R1,R0          POINT                                 00747900
               LR     R0,R1                         TO                     00748000
               BCTR   R1,0                  NUMERIC PORTION                00748100
               EX     R1,BLDEC       BLANK IT                              00748200
               LR     R1,R0          RESTORE REG                           00748300
                                                                           00748400
```

```
MVL        CLI   0(R15),C'0'          DIGIT?                        00748500
           BL    BCTDEC        DON'T MOVE                           00748600
           MVC   0(1,R14),0(R15)      MOVE IN SIG DIGIT             00748700
BCTDEC     BCTR  R14,0                BUMP                          00748800
           BCTR  R15,0                BACK                          00748900
           BCT   R1,MVL               KEEP GOIN'                    00749000
                                                                    00749100
DECEND     EQU                                                      00749200
           CVB   R1,DOUBLE            GET PLEN                      00749300
           BCTR  R1,0          FIX FOR EX                           00749400
           EX    R1,OCDEC      MAKE ALL NUMERIC                     00749500
           EX    R1,MVCDEC     MOVE TO R6                           00749600
           LA    R14,22(R6)    BUMP TO                              00749701
           MVI   0(R2),C'E'                                         01280000
           B                   ERROR                                01290000
                                                                    01300000
SERROK     EX    R14,PUTDATAE         DO MOVE INTO FINDFLDT         01310000
LH      R14,HALFWORD RESTORE LENGTH OF TARGET FILED                 01320000
           BCTR  R14,0                                              01330000
           LTR   R14,R14       TEST REGISTER                        01330100
           BM    GOBACK               IF NEGITIVE DON'T MOVE IT     01330200
                                                                    01330300
           CLI   COMAFTYP,C'P'                                      01330400
           BE    DOPACKED                                           01330500
           CLI   COMAFTYP,C'B'                                      01330600
           BE    DOBINARY                                           01330700
                                                                    01330800
           EX    R14,CLCDATA  CHECK IF DATA HAS CHANGED             01330900
           BE    GOBACK       NOCHANGE, GOBACK                      01331000
           EX    R14,MOVEDATA MOVE DATA INTO TARGET FIELD           01331100
           CLC   COMAFNDF(4),=C'MDAS'                               01331200
           BE    GOBACK                                             01331300
           B     SAYENT                                             01331400
                                                                    01331500
DOPACKED   EQU                                                      01331600
           CLI   COMASERR,C'Y'                                      01331700
           BE    DATADONE                                           01331800
           MVC   CHAR9,NUMZONE                                      01331900
           LA    R1,CHAR9                                           01332000
           LA    R1,9(R1)                                           01332100
           MVZ   NUMCHECK(2),COMAOLEN                               01332200
           CLC   NUMCHECK(2),NUMZONE                                01332300
           BNE   FDERR                                              01332400
           CLC   COMAOLEN,NUMZONE                                   01332500
           BNE   OLOK                                               01332600
           EX    R14,PACKDA                                         01334400
           B     DATADONE                                           01334500
                                                                    01334600
DOBINARY   EQU                                                      01334700
           CLI   COMASERR,C'Y'                                      01334800
           BE    DATADONE                                           01334900
           MVC   CHAR9,NUMZONE                                      01335000
           LA    R1,CHAR9                                           01335100
           LA    R1,9(R1)                                           01335200
           MVZ   NUMCHECK(2),COMAOLEN                               01335300
           CLC   NUMCHECK(2), NUMZONE                               01335400
           BNE   FDERR                                              01335500
           CLC   COMAOLEN,NUMZONE                                   01335600
           BNE   OLOK2                                              01335700
           MVC   COMAOLEN,COMAPLEN                                  01335800
```

```
OLOK2     PACK  DOUBLE2,COMAOLEN                                            01335900
          CVB   R2,DOUBLE2                                                  01336000
          SR    R1,R2                                                       01336100
          EX    R2,LOADNUMB                                                 01336200
          PACK  DOUBLEE,CHAR9                                               01336300
          CVB   R1,DOUBLE                                                   01336400
          CLC   COMAPLEN,=C'02'                                             01336500
          BNH   DOHALF                                                      01336600
DOFULL    ST    R1,0(R15)                                                   01336700
          B     DATADONE                                                    01336800
DOHALF    STH   R1,0(R15)                                                   01336900
          B     DATADONE                                                    01337000
                                                                            01337200
DATADONE  EQU                                                               01337300
                                                                            01337400
SAYENT    MVI   COMAENT,C'Y'                                                01337500
          B     GOBACK                                                      01339300
BLNCHECK  CLC   0(*-*,R6),BLANKS                                            01339400
PUTDATAE  MVC   FINDFLDT(*-*),0(R6)                                         01339500
CLCDATA   CLC   0(*-*,R15),FINDFLDT                                         01339600
MOVEDATA  MVC   0(*-*,R15),FINDFLDT                                         01339700
LOADNUMB  MVC   0(*-*,R1),0(R6)                                             01339800
PACKDATA  MVC   0(*-*,R15),0(R1)                                            01339900
                                                                            01340000
ERROR     EQU                                                               01340100
          MVI   COMAERRF,C'Y'                                               01340200
          MVI   COMASERR,C'Y'                                               01340300
RETURN    DS    0H                                   SFW001                 01340400
          MVC   COMADECP,BLANKS                                             01340500
          EXEC CICS RETURN,                          SFW001                 01340600
                                                                            01340700
          CONSTANTS                                                         01340800
                                                                            01340900
ASIS   DC C'N'  Y=NO UPPER/LOWER CASE TRANSLATION                           01341000
BLANKS    DC    CL256' '                                                    01341100
HEXZERO   DC    30X'00'                                                     01341200
NUMZONE   DC    24C'0'                                                      01341300
HEXFF     DC    30X'FF'                                                     01342000
                                                                            01343000
CKTR      TR    0(*-*,R6),UPCASE       TRANSLATE TO UPPER CASE              01344000
UPCASE    DC    X'000102030405060708090A0B0C0D0E0F'                         01345000
          DC    X'101112131415161718191A1B1C1D1E1F'                         01346000
          DC    X'202122232425262728292A2B2C2D2E2F'                         01347000
          DC    X'303132333435363738393A3B3C3D3E3F'                         01348000
          DC    X'404142434445464748494A4B4C4D4E4F'                         01349000
          DC    X'505152535455565758595A5B5C5D5E5F'                         01350000
          DC    X'606162636465666768696A6B6C6D6E6F'                         01360000
          DC    X'707172737475767778797A7B7C7D7E7F'                         01370000
          DC    X'80C1C2C3C4C5C6C7C8C98A8B8C8D8E8F'                         01380000
          DC    X'90D1D2D3D4D5D6D7D8D99A9B9C9D9E9F'                         01390000
          DC    X'A0A1E2E3E4E5E6E7E8E9AAABACADAEAF'                         01400000
          DC    X'B0B1B2B3B4B5B6B7B8B9BABBBCBDBEBF'                         01410000
          DC    X'C0C1C2C3C4C5C6C7C8C9CACBCCCDCECF'                         01420000
          DC    X'D0D1D2D3D4D5D6D7D8D9DADBDCDDDEDF'                         01430000
          DC    X'E0E1E2E3E4E5E6E7E8E9EAEBECEDEEEF'                         01440000
          DC    X'F0F1F2F3F4F5F6F7F8F9AFBFCFDFEFFF'                         01450000
                                                                            01460000
          DS    OH                                                          01470000
                                                                            01480000
     LTORG                                                                  01490000
       END                                                                  01500000
```

```
          BE     TIMOUT1              YES, CONTINUE
          CLC    COMAVUID,BLANKS      HAS THERE BEEN A VALID USER?
          BNH    GOTMDAS              NO, CONTINUE
          CLC    COMAEXSS(9),COMAVUID      NO, IS IT THE SAME ONE?
          BE     TIMOUT1              YES, CONTINUE
          B      STARTOVR             NO, START OVER

TIMOUT1   EQU
          ZAP    DOUBLE2,MDASLTIM     CHECK TO SEE IF TIMED OUT
          MVC    MDASLTIM,DOUBLE      UPDATE LAST ACCESS TIME
          AP     DOUBLE2,TIMEOUT1            |
          CLC    DOUBLE,DOUBLE2              |
          BNH    GOTMDAS              IT'S OK
          BH     PUTCKEY              YES,CONTINUE
          CLC    COMAEXSS,BLANKS      WAS COMAKEY THERE ALREADY?
          BNH    GOTCKEY              YES, CONTINUE
          MVC    COMAKEY(9),COMAEXSS       NO, PUT IT IN COMMAREA
          B      GOTCKEY              YES, CONTINUE
PUTCKEY   MVC    COMAKEY(9),SAVEXSS        NO, PUT IT IN COMMAREA

GOTCKEY   MVI    COMAERRF,C' '
          MVI    COMACONT,C' '
          MVI    COMAMI01,C' '
          MVI    COMAPROF,C' '
          MVI    COMAFTYP,C' '
          MVC    COMAEDTC,BLANKS
          ZAP    COMAUSEG,=P'0'
          MVI    COMAPROF,C' '

          UNPK   COMAMQNM,EIBTASKN         COPY TD QUEUE PREFIX
          OI     COMAMQNM+7,C'0'
          MVC    COMAPROF,SAVEPROF
          MVC    COMAMVAR,SAVEMVAR
          MVC    COMAMVLN,SAVEMVLN
          MVC    MDASLTIM,DOUBLE
          MVC    COMACOML,COMLTH

          LH     R14,=H'11'
          LA     R15,COMAFICT          PUT DATA HERE
          MVC    COMAFNDF,=C'FACTFICT'     DATA IDENTIFIER
          BAL    R4,GETDATA                GO GET IT

          LH     R14,=H'11'
          LA     R15,COMAFIC1              PUT DATA HERE
          MCV    COMAFNDF,=C'FACTFICE'           DATA IDENTIFIER
          BAL    R4,GETDATA                GO GET IT

          LH     R14,=H'10'
          LA     R15,SAVETOPC              PUT DATA HERE
          MVC    COMAFNDF,=C'MDASTRAN'     DATA IDENTIFIER
          BAL    R4,GETDATA                GO GET IT
          CLC    SAVETOPC,BLANKS
          BNH    DQERROR                   YES, CONTINUE
          MVC    COMATOPC,BLANKS
          MVC    COMATOPC(10),SAVETOPC
NOTMDAS   EQU
      DEBUGDEBUGDEBUGDEBUG
          CLC    COMATOPC(10),=C'MI-PINT2'
          BNE    AFTDBUG1
DEBUG1    B      AFTDBUG1
AFTDBUG1  EQU
```

```
         DEBUG          DEBUG          DEBUG          DEBUG
TRYAGAIN       EQU
               EXEC CICS UNLOCK DATASET('RAMDAS')
               MVC    COMAPROC,SAVEPROC
               MVI    COMAPROF,C'S' FACTS RESPONSE
               B      DEQ
DQERROR        EQU
               MVC    MDASKEYY,BLANKS
               MVC    COMATOPC,BLANKS
               B      DEQ

DEQ            EQU
               EXEC CICS DEQ RESOURCE(MIDASSTE) LENGTH(8)
               CLI    FACTSREQ,C'Y'                FACTS REQUEST?
               BNE    RETURN                       NO, RETURN
               MVC    COMAPROC,SAVEPROC
               B      RETURN
NORESRC        EQU           NO RESOURCES AVAILABLE
               MVC    COMAMESS,BLANKS
               MVC    COMAMESS(12),=C'NO RESOURCES

ERROR          EQU
               MVC    MDASKEYY,BLANKS
RETURN         EQU
               EXEC CICS DEQ RESOURCE(MIDASSTE) LENGTH(8) NOHANDLE

RETURN2        EQU
               EXEC CICS RETURN

               COPY RAMIGETP

BLANKS         DC     CL130' '
NUMZONE        DC     15C'0'
               LTORG
                      END    RAMI0300
```

APPENDIX E

```
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      SUBROUTINE RAM2A000
-------------------------------------

      FUNCTION:

      Read a incoming data and determine what file to read
      Read a VSAM data set
      Determine if the transaction is update, if so, update record
      Format Web Page for browser




             PRINT NOGEN
             COPY RARAREGS
             COPY RAMICOMM
             COPY RARAMTEX
             COPY RARAGATX
             COPY RARAMSTY
             COPY RARAMIOB
             COPY  RARAOLEG
             USING COMMAREA,R5

             COPY RARAQUED
QUEUE        DSECT

QLINES       EQU   45     __THESE TWO LINES NEED TO BE IN THE JOB
QLINELEN     EQU   200     /

QUEAREA      DSECT
QOUT         DS    OCL500
QUELINE      DS    CL500
QUELLEN      EQU   *-QUEAREA
             USING QUEAREA,R12

RADSECTO     DSECT

INSERTDS

DYNAMIC STORAGE

DFHEISTG     DSECT
             COPY  DFHAID
             COPY  RARASPAD
INSERTT
UPAD         DS          C
SCTY         DS          C
NEWTOPC      DS          C
```

```
 AUTOADD     DS          C                                           00334000
 DELFLD      DS          CL4                                         00335000
 ALBS        DS          CL1                                         00336000
 TRECLEN     DS          CL2                                         00337000
 KEYOFF      DS          CL4                                         00338000
 HEDLEN      DS          CL2                                         00339000
 SEGLEN      DS          CL2                                         00340000
 SEGOFF      DS          CL2                                         00350000
 LEVOFF      DS          CL2                                         00360000
 SEGCOUNT    DS          PL2                                         00370000
 NEWSEGS     DS          PL2                                         00380000
 ADDROLEG    DS          CL4                                         00390000
 SADDOLEG    DS          CL4                                         00400000
 SCNTOLEG    DS          CL4                                         00410000
 APPID       DS          CL4                                         00411000
 QLINES      DS          CL3                                         00411100
 QLIMIT      DS          CL3                                         00411200
 QLINELEN    DS          CL3                                         00411300
 MAXSEGS     DS          PL3                                         00411400
 FIXED       DS          C                                           00411500
 QINSEG      DS          CL1                                         00411600
 KEYLEN      DS          CL3                                         004117000
 DISPLAY     DS          C                                           00411800
 COURSE      DS          CL8                                         00411900
 SECTION     DS          CL4                                         00412000
 RDONLY      DS          CL1                                         00412100
 SAVE9       DS          F                                           00412200
 SVE10       DS          F                                           00412300
 SAVE2       DS          F                                           00412400
 SVE4        DS          F                                           00412500
 SAVE7       DS          F                                           00412600
 SAVE12      DS          F                                           00412700
 SAVE14      DS          F                                           00412800
 SAVE 15     DS          F                                           00412900
 RDCNT       DS          PL3                                         00413000
 RDMAX       DS          PL3                                         00413100
 TAGMAX      DS          PL3                                         00413200
 TAGCNT      DS          PL3                                         00413300
 FINDFLD     DS          CL8                                         00413400
 FINDFLDT    DS          CL79                                        00413500
 THISSEG     DS          PL2                                         00413600
 TEMP03      DS          CL3                                         00413700
 OUTBLNK     DS          CL1                                         00413800
                                                                     00413900
        PROGRAM RAMI2A00 STARTS HERE                                 00414000
                                                                     00415000
RAMI2A00     DFHEIENT    CODEREG=(3,7,8)                             00416000
RAMI2A00     AMODE 31                                                00417000
RAMI2A00     RMODE ANY                                               00418000
                                                                     00419000
                                                                     00420000
                                                                     00430000
START        EQU                                                     00440000
             CLD    EIBCALEN,=H'0'                                   00450000
             BE     RETURN                                           00460000
             L      R5,DFHEICAP                                      00470000
             USING  COMMAREA,R5                                      00480000
             MVI    COMACONT,C' '                                    00490000
                                                                     00500000
             EXEC CICS HANDLE CONDITION DSIDERR(ERROR)               00520000
             UNPK   KEYLEN,DOUBLE2                                   00805600
```

```
          OI    KEYLEN+2,C'0'                                         00805700
                                                                      00805800
          BAL   R4,CLEANKEY                                           00805900
                                                                      00806000
INSERTI                                                               00807000
                                                                      00808000
          PACK  DOUBLE,QLINES                                         00809000
          CVB   R15,DOUBLE                                            00810000
          PACK  DOUBLE,QLINELEN                                       00820000
          CVB   R14,DOUBLE                                            00821000
          ST    R14,FWORD                                             00822000
          SR    R14,R14                                               00823000
          M     R14,FWORD                                             00824000
          STH   R15,COMAQLEN                                          00825000
                                                                      00826000
EXEC CICS GETMAIN LENGTH(COMAQLEN) INITIMG(X'40') SET (12R)           00827000
          ST    R12,COMAQADD                                          00828000
          LR    R14,R12                                               00829000
          AH    R14,COMAQLEN                                          00830000
          PACK  DOUBLE,QLINELEN                                       00840000
          CVB   R15,DOUBLE                                            00850000
          STH   R15,HALFWORD                                          00860000
          SH    R14,HALFWORD                                          00870000
          SH    R14,HALFWORK                                          08710000
          ST    R14,COMAQ                                             00872000
          MVC   COMAQLLN,HALFWORD                                     00873000
          PACK  DOUBLE,QLINES                                         00874000
          ZAP   RDMAX,DOUBLE                                          00875000
          ZAP   TAGMAX,DOUBLE                                         00876000
          ZAP   TAGCNT,=P'3'                                          00877000
          ZAP   RDCNT,=P'0'                                           00878000
                                                                      00879000
                                                                      00879100
          MVI   COMAERRF,C' '                                         00879200
          MVI   COMAENT,C' '                                          00879300
          MVI   COMACMD,C' '                                          00879400
                                                                      00879500
          CLI   COMASTUD,C'A'                                         00879600
          BE    CK4ADD                                                00879700
                                                                      00879800
          CLC   COMATOPL,COMATOPC                                     00879900
          BE    SAMETOPC                                              00880000
          MVI   NEWTOPC,C'Y'                                          00880100
          B     READ2ND                                               00880200
                                                                      00880300
SAMETOPC  LH    R14,=H'1'                                             00880400
          LA    R15,COMACMD                                           00880500
          MVC   COMAEDTC,BLANKS                                       00880600
          MVC   COMAEDIO,BLANKS                                       00880700
          MVC   COMAFNDF,=C'MDASNEXT'                                 00880800
          MVI   COMADECP,C' '                                         00880900
          BAL   R4,GETDATA                                            00881000
          MVI   COMAERRF,C' '                                         00882000
          SR    R15,R15                                               01320000
          IC    R15,0(R14)                                            01330000
          LA    R15,1(15)                                             01340000
          STC   R15,0(R14)                                            01350000
          STC   R15,COMALEVL                                          01360000
                                                                      01370000
          ZAP   COMAUSEG,=P'0'                                        01390000
```

```
                                                                   01400000
              L       R10,ADDROLEG                                 01440000
              USING   RARAOLEG,R10                                 01450000
                                                                   01460000
              ZAP     DOUBLE,OLEGSC                                01470000
              CVB     R2,DOUBLE                                    01480000
              BNP     ERROR                                        01481000
                                                                   01482000
              LA      R10,OLEGHLEN(R10)                            01483000
              USING   OLEGS,R10                                    01484000
                                                                   01485000
              ZAP     DOUBLE2,=P'0'                                01486000
UPLOOP        EQU                                                  01487000
                                                                   01488000
              CLC     P;EGFMA,.=C'---'                             01489000
              BE      UPBCT                                        01490000
                                                                   01500000
              CLI     OLEGWHER,C'S'                                01510000
              BE      UPSEGS                                       01510100
                                                                   01510200
              MVC     COMAEDTC,OLEGEDIT                            01510300
              MVC     COMAEDIO,OLEGEDIO                            01510400
              MVC     COMAFTYP,OLEGFTYP                            01510500
              PACK    DOUBLE,OLEGFOFF                              01510600
              CVB     R14,COMAFWD3                                 01510700
              STH     R14,DOUBLE                                   01510800
              LR      R15,R9                                       01510900
              AH      R15,COMAFWD3                                 01511000
              PACK    DOUBLE,OLEGLENG                              01512000
              AP      DOUBLE2,DOUBLE                               01513000
              CVB     R14,DOUBLE                                   01514000
              AR      R14,R15        STORAGE VIOLATION PROTECTION  01514111
              C       R14,COMAREND   "                             01514211
              BH      BADADDR        "                             01514311
              CVB     R14,DOUBLE     "                             01514411
                                                                   01514511
              MVC     OMAFNDF(4),APPID                             01514611
              MVC     COMAFNDF+4(4),OLEGFNAM                       01515100
              MVC     COMAPLEN,OLEGLENG                            01515200
              MVC     COMAKEYF,OLEGHKEY                            01515300
              MVC     COMAFTYP,OLEGFTYP                            01515400
              MVC     COMAOLEN,OLEGOLEN                            01515500
              MVC     COMADECP,OLEGDECP                            01515600
              LH      R15,RECLEN                                   01515700
              CLI     FIXED,C'Y'                                   01525200
              BE      NOFADD1                                      01525300
              AR      R15,R14                                      01525400
NOFADD1       STH     R15,TRECLEN                                  01525500
              ST      R2,SAVE2                                     01525600
              EXEC CICS GETMAIN SET(R2) LENGTH(TRECLEN) INITIMG(X'40')  01525700
                                                                   01525800
              LR      R0,R2                                        01525900
              L       R14,BFILADDR                                 01526000
              LH      R1,HALFWORD                                  01526100
              MVCL    R0,R14                                       01526200
              LR      R9,R2                                        01526300
              ST      R9,BFILADDR                                  01526400
              ST      R9,SAVE9                                     01526500
              AH      R9,HALFWORD                                  01526600
              SH      R9,SEGLEN                                    01526700
              L       R2,SAVE2                                     01526800
```

```
                                                                        01526900
NOINS19   MVC   COMAEDTC,OLEGEDIT                                       01527000
          MVC   COMAEDIO,OLEGEDIO                                       01527100
          MVC   COMAFTYP,OLEGFTYP                                       01527200
          PACK  DOUBLE,OLEGFOFF                                         01527300
          CVB   R14,DOUBLE                                              01527400
          STH   R14,COMAFWD3                                            01527500
          LR    R15,R9                                                  01527600
          AH    R15,COMAFWD3                                            01527700
          ST    R15,COMAFWD3                                            01527800
          PACK  DOUBLE,OLEGLENG                                         01527900
          AP    DOUBLE2,DOUBLE                                          01528100
          CVB   R14,DOUBLE                                              01528200
                                                                        01528300
          AR    R14,R15      STORAGE VIOLATION PROTECTION               01528400
          C     R14,COMAREND      "                                     01528600
          BH    BADADDR           "                                     01528711
          CVB   R14,DOUBLE        "                                     01528811
                                                                        01528911
          MVC   COMAFNDF(4),APPID                                       01529011
          MVC   COMAFNDF+4(4),OLEGFNAM                                  01529111
          MVC   COMAPLEN,OLEGLENG                                       01529211
          MVC   COMAKEYF,OLEGHKEY                                       01529300
          MVC   COMAFTYP,OLEGFTYP                                       01529400
          MVC   COMAOLEN,OLEGOLEN                                       01529500
          MVC   COMADECP,OLEGDECP                                       01529600
          BAL   R4,GETDATA                                              01529700
                                                                        01529800
          CLI   ADDFLAG,C'Y'                                            01529900
          BE    NODELSEG                                                01530000
                                                                        01530100
                                                                        01530200
                                                                        01530300
          BCT   R4,SEGULOP                                              01530400
                                                                        01540000
SEGSDONE  L     R9,SAVE9                                                01540100
                                                                        01540200
UPLOVER   EQU                                                           01540300
                                                                        01540400
                                                                        01540500
          CLI   COMAENT,C'Y'                                            01540600
          BNE   NOENT19                                                 01540700
                                                                        01540800
          CLI   COMAERRF,C'Y'                                           01540900
          BE    NOENT19                                                 01541000
                                                                        01541100
          CLC   SEGOFF,HEXZEROS                                         01541200
          BE    R14.SEGOFF                                              01541300
          LH    R14.SEGOFF                                              01541400
          LR    R15,R9                                                  01541500
          AR    R14,R15                                                 01541600
                                                                        01541700
                                                                        01541800
          CLI   SCTY.C'B'                                               01541900
          BNE   NOTSZB2                                                 01542000
          LH    R15,0(R14)                                              01543000
          CVD   R15.DOUBLE                                              01544000
          AP    DOUBLE.NEWSEGS                                          01545000
          BH    OVERMAX                                                 01546000
          CVB   R15.DOUBLE                                              01547000
          STH   R15.0(2,R14)                                            01548000
```

```
              B       NONS19



NOTSZB2       CLI     SCTY,C'Z'
              BNE     NOTSZ2
              PACK    DOUBLE,0(2,R14)
              AP      DOUBLE,NEWSEGS
              CP      DOUBLE,MAXSEGS
              BH      OVERMAX
              UNPK    0(2,R14),DOUBLE
              B       NONS19

NOTSZ2        AP      0(2,R14),NEWSEGS
              CP      0(2,R14,MAXSEGS
              BH      OVERMAX
NONS19        EQU
              CLI     UPAD,C'N'
              BE      NOENT19

              EXEC CICS REWRITE DATASET(COMAFILE) FROM(RARSECTO)
                      LENGTH(RECLEN)
              MVI     REWRITE,C'R'
LOADSCRN      EQN

              CLC     COMAS001,BLANKS
              BH      DOS001

              CLI     COMAERRF,C'Y'
              BNE     CKALGO
              CLC     COMAALGN,BLANKS
              BNH     NOALGO
              MVC     COMAIBFN,COMAALGN
              B       DOXXRET

CKALGO        CLI     NEWTOPC,C'Y'
              BE      NOALGO
              CLC     COMAALGO,BLANKS
              BNH     NOALGO
              MVC     COMAIBFN,COMAALGO
              B       COXXRET
NOALGO        EQU

              INSERT LOCATION S001



DOS001        CLC     COMAS001,BLANKS
              BNH     NOS001

              MVC     COMAMSGF,BLANKS
              ST      R12,COMAUP12
              MVC     SPADSKEY,COMAS001

              CLC     COMAS001(4),-C'RAMI'
              BE      NOTOBJ
EXEC CICS HANDLE CONDITION NOTFND(NOTOBJ) NOTOPEN(NOTOBJ)
        DISABLED(NOTOBJ)
EXEC CICS READ DATASET('RAMIOB') SET(R1) RIDFLD(COMAS001)
        LENGTH(HALFWORD)
              USING   RARAMIOB,R1
```

```
         MVC    SPADSKEY.MIOBLOOK                                        02058008
         EXEC CICSA HANDLE CONDITION PGMIDERR(BADSUBR)                   02058114
  EXEC CICS HANDLE CONDITION NOTFND(NOTFND) NOTOPEN(NOTOPEN)              02059008
         DISABLED(NOTOPEN)                                               02059108
                                                                         02059208
  NOTOBJ         EXEC CICS HANDLE CONDITION PGMIDERR(NOS001)             02060008
  EXEC CICS LINK PROGRAM(SPADSKEY) COMMAREA(COMMAREA)                    02061008
                                                                         02070000
                          LENGTH(COMAUPL)                                02080000
                 L        R12,COMAUP                                     02090000
                 CLC      COMAMSGF,=C'OK'                                02100000
                 BNE      ERROR                                          02100106
                 CLI      NEWTOPC,C'Y'                                   02100206
                 BE       NOALGOS                                        02100306
                 CLC      COMAALGO,BLANKS                                02100406
                 MVI      52(R12),X'15'                                  02714000
                 BAL      R10,TAGS                                       02715000
  NONXPR19       EQU                                                     02716000
                                                                         02717000
  INSERT1        BEFORE         MOVE                                     02718000
                                                                         02719000
  AUADD          EQU                                                     02720000
                                                                         02730000
                 CLI      COMASTUD,C'A'                                  02740000
                 BNE      NOAUAD3                                        02750000
                 CLI      COMACMD,C'A'                                   02760000
                 BNE      NOAUAD3                                        02770000
                 MVC      COMAIBFN,=C'2'                                 02780000
                 B        RETURN                                         02790000
  NOAUAD3        EQU                                                     02800000
                                                                         02810000
                 L        R10,ADDROLEG                                   02820000
                 USING    RARAOLEG,R10                                   02830000
                                                                         02831000
                 ZAP      DOUBLE,OLEGSC                                  02832000
                                                                         02832100
                 CVB      R2,DOUBLE                                      02832200
                 BNP      ERROR                                          02832300
                                                                         02832400
                 LA       R10,OLEGHLEN(R10)                              02832500
                 USING    OLEGS,R10                                      02832600
                 ZAP      DOUBLE2,=P'0'                                  02832700
                                                                         02832800
  OPLOOP         EQU                                                     02832900
                                                                         02833000
                 CLI      OLEGWHER,C'S'                                  02834000
                 BE       SPLOOP                                         02835000
                                                                         02836000
                 ZAP      COMAUSEG,=P'0'                                 02837000
                                                                         02838000
  CKTABS         CLI      OLEGTABL,C'S'                                  02839000
                 BNE      CKTABR                                         02839100
                 MVC      QOUT(07),=C'<TABLE>'                           02939200
                 ST       R10,SAVE10                                     02839300
                 BAL      R10,TAGS                                       02839400
                 L        R10,SAVE10                                     02839500
                 MVC      QOUT(36),=C'<TR VALIGN="TOP" ALIGHN="LEFT"><TD>'   02839600
                 MVC      QOUT(36),=C'<TR VALIGN="TOP" ALIGHN="LEFT">    '   02839700
                 ST       R10,SAVE10                                     02839800
                 BAL      R10,TAGS                                       02839900
                 L        R10,SAVE10                                     02840000
```

```
          B     TABOVER                                                   02840100
CKTABR    CLI   OLEGTABL,C'R'                                             02840200
          BNE   CKTABD                                                    02840300
          MVC   QOUT(36),=C'</TR><TR VALIGHN="TOP" ALIGN="LEFT">'         02840400
          BNP   NOGATX                                                    02851500
          LA    R2,GATXHLEN(R2)                                           02851600
          USING GATXS,R2                                                  02851700
                                                                          02851800
GATXLOOP  MVC   QOUT(79),GATXCOMM                                         02851900
          MVI   QOUT+79,X'15'                                             02852000
          ST    R14,FWORD                                                 02852100
          ST    R10,SAVE10                                                02852200
          BAL   R10,TAGS                                                  02852300
          L     R10,SAVE10                                                02852400
          L     R14,FWORD                                                 02852500
          LA    R2,GATXSLEN(R2)                                           02852600
          BCT   R14,GATXLOOP                                              02852700
NOGATXQEXECCICSHANDLECONDITIONNOTFND(NOTFND)NOTOPEN(NOTOPEN) 02852800
          DISABLED(NOTOPEN)                                               02852900
          MVC   0(5,R12),=C'</TD>'                                        02853000
          MVI   5(R12),X'15'                                              02853100
                                                                          02852000
          ST    R10,SAVE                                                  02853300
          BAL   R10,TAGS                                                  02853400
          L     R10,SAVE10                                                02853500
          B     TABOVERE                                                  02853600
                                                                          02853700
                                                                          02853800
TABOVERE  EQU                                                             02853900
                                                                          02854000
OPBCT     LA    R10,OLEGSLEN(R10)                                         02854100
          BCT   R2,OPLOOP                                                 02854200
                                                                          02854300
          B     CKERRF19                                                  02854400
                                                                          02854500
                                                                          02854600
SPLOOP    EQU                                                             02854700
                                                                          02854800
          ZAP   THISSEG,=P'0'                                             02854900
          ZAP   COMAUSEG,=P'1'                                            02855000
                                                                          02855100
          ST    R10,SADDOLEG                                              02855200
          ST    R2,SCNTOLEG                                               02855300
                                                                          02855400
          LH    R14,SEGOFF                                                02855500
          LR    R15,R9                                                    02855600
          AR    R14,R15                                                   02855700
          CLI   SCTY,C'B'                                                 02855800
          BNE   NOTSZB4                                                   02855900
          LH    R15,0(R14)                                                02856000
          CVD   R15,DOUBLE                                                02856100
          ZAP   DOUBLE2,DOUBLE                                            02856200
          B     SKSZ4                                                     02856300
NOTSZB4   CLI   SCTY,C'Z'                                                 02856400
          BNE   NOTSZ4                                                    02856500
          PACK  DOUBLE,0(2,R14)                                           02864900
          STH   R14,COMAFWD3                                              02865000
          LR    R6,R9                                                     02865100
          AH    R6,COMAFWD3                                               02865200
          PACK  DOUBLE,OLEGLENG                                           02865300
          AP    DOUBLE2,DOUBLE                                            02865400
```

```
             CVB    R14.DOUBLE                                       02865512
             AR     R14,R6        STORAGE VIOLATION PROTECTION       02865613
             C      R14,COMAREND        "                            02865712
             BH     BADADDR             "                            02865812
             CVB    R14.DOUBLE          "                            02865912
                                                                     02866012
             MVC    COMAFNDF(4),APPID                                02866100
             MVC    COMAFNDF+4(4),OLEGFNAM                           02866200
             MVC    COMAREAS,OLEGHEAD                                02866300
             MVC    COMAPLEN,OLEGLENG                                02866400
             MVC    COMAKEYF,OLEGHKEY                                02866500
SETOB19      MVI    OUTBLNK,C'Y'                                     02878200
             AP     COMAUSEG,=P'1'                                   02878300
             B      SEGLOOP                                          02878400
                                                                     02878500
CKERRF19     EQU                                                     02878600
                                                                     02878700
                                                                     02878800
INSERT1      MVC                                                     02878900
INSERT1      AFTER MOVE                                              02879000
                                                                     02879100
             CLI    COMAERRE,C'Y'                                    02879200
             BNE    NOERR2                                           02879300
ERR2ND       EQU                                                     02879400
                                                                     02879500
             CLI    REWRITE,C'E'                                     02879600
             BE     DUPE19                                           02879700
                                                                     02879800
             MVC    SPADSKEY,BLANKS                                  02879900
             MVC    SPADSKEY(10),=C;'INPUTERROR'                     02880000
EXEC CICS HANDLE CONDITION NOTFND(N2GATX)NOTOPEN(N2GATX)             02880100
                    RIDFLD(SPADSKEY)                                 02880200
                                                                     02880300
             USING RARAGATX,R2                                       02880400
             ZAP    DOUBLE,GAT                                       02880500
             CVB    R14,DOUBLE                                       02880600
             BNP    N2GATX                                           02880700
             LA     R2,GATXHLEN(R2)                                  02880800
             USING GATXS,R2                                          02880900
                                                                     02881000
GATXL002     MVC    QOUT(79),GATXCOMM                                02881100
             MVI    QOUT+79,X'15'                                    02881200
             ST     R14,FWORD                                        02881300
             ST     R10,SAVE10                                       02881400
             BAL    R10,TAGS                                         02881500
             L      R10.SAVE10                                       02881600
             L      R14.FWORD                                        02881700
             LA     R2,GATXSLEN(R2)                                  02881800
             BCT    R14,GATXL002                                     02881900
N2GATX EXEC CICSHANDLECONDITION NOTFND(NOTFND) NOTOPEN(NOTOPEN)      02882000
             DISABLED(NOTOPEN)                                       02882100
B            NOUP19                                                  02882200
                                                                     02882300
DUPE19       MVC    0(30.R12),=C'<B>RECORD EXISTS,NOT ADDED</b>'     02882400
             MVI    30(R12),x'15'                                    02882500
             AH     R12,COMMAQLLN                                    02882600
             B      NOUP19                                           02882700
                                                                     02882800
                                                                     02882900
NOERR2       EQU                                                     02883000
```

```
                                                                  02883100
                                                                  03374100
               ZAP    DOUBLE,OLEGSC                               03374200
               CVB    R2.DOUBLE                                   03374300
               BNP    ERROR                                       03374400
                                                                  03374500
               LA     E10,OLEGHLEN(10)                            03374600
               USING  OLEGSR10                                    03374700
                                                                  03374800
               ZAP    DOUBLE2,=P'0'                               03374900
     PKLOOP    CLI    OLEGHKEY,C' '                               03375000
               BCG    PKBCT                                       03375100
                                                                  03375200
               LA     R15,COMAKEY+000                             03375300
               PACK   DOUBLE,OLEGFOFF                             03375400
               CVB    R14,DOUBLE                                  03375500
               STH    R14,COMAFWD3                                03375600
               LA     R6,BLANKS                                   03375700
               PACK   DOUBLE,OLEGLENG                             03375800
               AP     DOUBLE2,DOUBLE                              03375900
               CVB    R14,DOUBLE                                  03376000
                                                                  03376112
               MVC    COMAFNDF(4),APPID                           03377000
               MVC    COMAFNDF+4(4),OLEGFNAM                      03378000
               MVC    COMAREAS,OLEGHEAD                           03379000
               MVC    COMAPLEN,OLEGLENG                           03380000
               MVC    COMAKEYF,OLEGHKEY                           03380100
               MVC    COMAEDIO,OLEGEDIO                           03380200
               MVC    COMACOLR,OLEGB1KY                           03380300
               MVC    COMADECP,OLEGDECP                           03380400
               MVC    COMABLZL,OLEGBLZL                           03380500
               MVI    COMARAIN,C'Y'                               03380600
               BAL    R4,PUTDATA                                  03380700
                                                                  03380800
     PKBCT     LA     R10,OLEGSLEN(10)                            03380900
               BCT    R2,PKLOOP                                   03381000
                                                                  03381100
                                                                  03381200
                                                                  03381300
               MVC    0(10,R12),=C'</FORM><P>'                    03381400
               MVI    10(R12),X'15'                               03381500
               AH     R12,COMAQLLN.                               03381600
                                                                  03381700
               MVC    QOUT(09),=C'</TR><TR>'                      03381800
               ST     R10,SAVE10                                  03381900
               BAL    R10,TAGS                                    03382000
               L      R10,SAVE10                                  03382100
                                                                  03382200
               MVC    QOUT(13),=C'</TR></TABLE>'                  03382300
               ST     R10,SAVE10                                  03382400
                                                                  03382000
                                                                  03870000
               BAL    R10,TAGS                                    03880000
               B      NOTAG19                                     03890000
                                                                  03900000
                                                                  03910000
     ERROR     EQU                                                03920000
               MVI    COMAERRF,C'Y'                               03930000
     EXEC CICS HANDLE CONDITION NOTFND(ERNOTF) NOTOPEN(ERNOTF)    03940000
                      DISABLED(ERNOTF)                            03950000
               MVC    SPADSKEY,BLANKS                             03960000
```

```
          MVC   SPADSKEY(5),=C'ERROR'
          CLC   COMAREGN,BLANKS
          BNH   LEAVEEF
          MVC   SPADSKEY(8),COMAREGN
LEAVEEFEXEC CICS READ DATASET('RAMSTY')SET(R2) LENGTH(HALFWORD)
          USING RARAMSTY,R2
          ZAP   DOUBLE,MSTYSC
          CVB   R14,DOUBLE
          BNP   ERNOTF
          LA    R2,MSTYHLEN(R2)
CKNOTFER  CLC   0(5,R2),=C'<FORM'
          BNE   CKSTUDER
          MVC   0(79,R12),0(R2)
          MVI   79(R12),X'15'
          AH    R12,COMAQLLN
          B     NOERBCT

CKSTUDER  CLI   COMASTUD,C'Y'
          BE    NOSTU192
          BE    ERNOTF

          CLI   COMAUPDA,C'N'
          BE    ERMDASAD
          CLI   UPAD,C'N'
          BE    ERMDASAD
          B     NOEROUT
ERMDASAD  CLC   NOERBCT
          BE    NOERBCT

NOROUT    MVC   0(79,R12),0(R2)
          AH    R12,COMAQLLN
NOERBCT   LA    R2,MSTYSLEN(R2)
          BCT   R14,CKNOTFER
          B     NOSTU192



ERNOTF    EQU
          B     NOSTU192
RETURN    EQU
          CLI   COMASTUD,C'A'
          BNE   DOXXRET
          CLI   COMACMD,C'A'
          BNE   DOXXRET
          MVC   COMAIBFN,=C'1'
          B     DOXXRET
DOXXRET   EQU
          EXEC  CICS RETURN


          COPY  RAMIGETP
          COPY  RAMIPUTP


CLEANKEY  LA    R10,COMAKEY
          SR    R2,R2               CLEAR REGISTER
          IC    R2,50               GET LENGTH OF FIELD ENTERED
          EX    R2,CKTR             TRANSLATE FIELD TO UPPER

          LA    R10,COMAKEY
          LA    R15,50
```

```
FIXHZ19     CLI    0(R10),X'00'                                                04100000
            BNE    BCTHZ19                                                     04110000
            MVI    0(R10),C' '                                                 04120000
BCTHZ10\9   LA     R10,1(R10)                                                  04130000
            BCT    R15,FIXHZ                                                   04140000
            BR     R4                                                          04150000
                                                                               04160000
PUTERROR    MVC    QUELINE(*-*),0(R14)                                         01470000
            COPY   RA02ERRM                                                    04180000
                                                                               04190000
                                                                               04200000
                                                                               04210000
            TITLE  'CONSTANTS AND LITERALS'                                    04220000
            DS     OF                                                          04230000
PACKONE     DC     PL4'1'                                                      04240000
BLANKS      DC     X'40'                                                       04250000
NUMZONE     DC     9C'0'                                                       04260000
HEXZEROS    DC     XL9'00'                                                     04270000
CKTR        TR     0(*-*,R10),UPCASE      TRANSLATE TO UPPER CASE              04280000
UPCASE      DC     X'000102030405060708090A0B0C0D0E0F'                         04290000
            DC     X'101112131415161718191A1B1C1D1E1F'                         04300000
            DC     X'202122232425262728292A2B2CD2E2F'                          04310000
            DC     X'303132333435363738393A3B3C3D3E3F'                         04320000
            DC     X'404142434445464748494A4B4C4D4E4F'                         04330000
            DC     X'505152535455565758595A5B5C5D5E5F'                         04340000
            DC     X'606162636465666768686A6B6C6D6E6F'                         04350000
            DC     X'707172737475767778797A7B7C7D7E7F'                         04360000
            DC     X'80C1C2C3C4C5C6C7C8C98A8B8C8D8E8F'                         04370000
            DC     X'90D1D2D3D4D5D6D7D8D99A9B9C9D9E9F'                         04380000
            DC     X'A0A1E2E3E4E5E6E7E8E9AAABACADAEAF'                         04390000
            DC     X'B0B1B2B3B4B5B6B7B8B9BABBBCBDBEBF'                         04400000
            DC     X'C0C1C2C3C4C5C6C7C8C9CCACBCDCECF'                          04410000
            DC     X'D0D1D2D3D4D5D6D7D8D9DADBDCDDDEDF'                         04420000
            DC     X'E0E1E2E3E4E5E6E7E8E9EAEBECEDEEEF'                         04430000
            DC     X'F0F1F2F3F4F5F6F7F8F9FAFBFCFDFEFF'                         04400000
            SPACE                                                              04450000
            DC     OH                                                          04460000
                                                                               04470000
                                                                               04480000
                                                                               04490000
      END   RAMI2A00                                                           04500000
```

APPENDIX F

```
         TSO FOREGROUND HARDCOPY
DSNAME=RA.PATENT                              (RAMI1T00)

         PROGRAM RAMI1T00

         SASS MENU INTERFACE
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         COPY  RACL0001
         COPY  RARAREGS

         COMMAREA STARTS HERE BASE REG IS R5

         COPY  RARAGATX          COPY COMMAREA DSECT
         COPY  RAMICOMM          COPY COMMAREA DSECT
         USING COMMAREA,R5

         FILE DSECT STARTS HERE  BASE REG IS R9

QLINELEN     EQU   140
TSL          EQU   5
QOUT         DSECT
             DS    CL79

             WORKING STORAGE
DFHEISTG     DSECT               COMMAREA DSECT

             SCRATCH PAD AREA



FOUNDIT      DS    C
FILENAME     DS    CL8
TEMPFLD      DS    CL79
FINDELDT     DS    CL79
             DS    OD
             DS    F
ANSWER       D     F'0'
DIVIDEND     DS    OD
QUOTIENT     DS    F
REMAINS      DS    F
DIVISOR      DS    F
MESS         DS    CL79
THISSEG      DS    PL3
FLDLEN       DS    F
AREAEND      DS    F
AWORD        DS    F
AREA1        DS    F
AREA14       DS    F
SV01         DS    F
SV014        DS    F
SV015        DS    F
SAVE4        DS    F
SAVE6        DS    F
SAVE2        DS    F
```

```
SAVE12      DS    F                                                     00143123
DD2         DS    F                                                     00143223
DDO         DS    F                                                     00143323
DD1         DS    F                                                     00143423
DD9         DS    F                                                     00143623
DD14        DS    F                                                     00143723
DD15        DS    F                                                     00143823
SI00        DS    F                                                     00143923
SI01        DS    F                                                     00144123
SI14        DS    F                                                     00144223
SI15        DS    F
MOVEADDR    DS    F                                                     00145003
MOVELENG    DS    H                                                     00146003
DDSOFF      DS    H                                                     00146103
RDMAX       DS    PL3                                                   00146203
RDCNT       DS    PL3                                                   00146303
TAGMAX      DS    PL3                                                   00146403
TAGCNT      DS    PL3                                                   00146503
DECIN       DS    CL30                                                  00146603
DECOUT      DS    CL30                                                  00146703
            COPY  RARASPAD                                              00146803
            PROGRAM     RAMI1T00 STARTS HERE                            00147003
            CLC   COMAEDIO,BLANKS                                       00150803
            BNH   EDTOK                                                 00150903
            ST    R0,SI00
            00151003
            ST    R1,SI01
            00152003
            ST    R14,SI14                                              00153003
            ST    R15,SI15                                              00154003
            ST    R6,COMAUP01                                           00155003
            ST    R12,COMAUP12
            00156003
       EXEC CICS LINK PROGRAM('RASI9200') COMMAREA(COMMAREA)             00157003
            LENGTH(COMACOML)                                            00158003
            L     R12,COMAUP12
            00159003
            L     R0,SI00
            00160003
            L     R1,SI01
            00170003
            L     R14,SI14                                              00180003
            L     R15,SI15                                              00190003
            B     NOSERRS                                               00200003
       EDTOK EQU                                                        00210003
                                                                        00220003
            CLC   COMABLZL,NUMZONE                                      00230003
            BNH   NOBLZL                                                00240003
            LR    R1,R6                                                 00250003
            PACK  DOUBLE,COMABLZL                                       00260003
            CVB   R0,DOUBLE                                             00261003
CKBLZL      CLI   0(R1),C'0'                                            00261103
            BNE   BCTBLZL                                               00261203
            MVI   0(R1),C' '                                            00261303
                                                                        00268523
            CLC   GATXCOMM(8),=C'<SELECT'                               00268623
            BE    DOSELC                                                00268723
            CLC   GATXCOMM(8),=C'<OPTION'                               00268823
            BNE   CKRADIO                                               00268923
            PACK  DOUBLE,COMAPLEN                                       00269023
            CVB   R15,DOUBLE                                            00269123
```

```
                BCTR  R15,0                                              00269223
                EX    R15,CHEKOPTN                                       00269323
                BNE   NOTOPT                                             00269423
                MVC   TEMPFLD(17),=C'<OPTION SELECTED '                  00269523
                MVC   TEMPFLD+17(62),GATXCOMM+8                          00269623
                MVC   GATXCOMM,TEMPFLD
                00269723
                B     NOTOPT                                             00269823
                                                                         00269923
CKRADIO         CLC   GATXCOMM(19),=C'<INPUT TYPE="RADIO" '              00270023
                BNE   CKAREA                                             00270123
                                                                         00270223
                CLC   GATXCOMM+26(4),=C'@@@@'                            00270323
                BNE   NOTOAPI                                            00270423
                MVC   GATXCOMM+26(4),COMAAPID
                00270523
                                                                         00270823
NOTOAPI         PACK  DOUBLE,COMAPLENT                                   00270923
                CVB   R15,DOUBLE                                         00271023
                BCTR  R15,0                                              00271123
                EX    R15,CHEKRADI
                00271223
                BNE   NOTOPT                                             00271323
                                                                         00271423
                MVC   TEMPFLD(27),=C'<input type="RADIO" CHECKED'        00271523
                MVC   TEMPFLD+27(52),GATXCOMM+19                         00271623
                MVC   GATXCOMM,TEMPFLD
                00271723
                B     NOTOPT                                             00271823
                                                                         00271923
CKAREA          CLC   GATXCOMM(16),=C'<textarea name=" '                 00272023
                BE    DOAREA                                             00272123
                CLC   GATXCOMM(12),=C'</textarea> '                      00272233
                BNE   NOTOPT                                             00272323
                MVC   0(79,R12)GATXCOMM                                  00272423
                MVI   79(R12),X'15'                                      00272526
                BAL   R10,TAGS                                           00272626
                B     SKTOPT                                             00272730
                                                                         00272826
DOAREA          CLC   GATXCOMM+16(4),=C'@@@@'                            00272926
                BNE   NOARAPI                                            00273026
                MVC   GATXCOMM+16(4),COMAAPID
                00273126
                                                                         00273226
NOARAPI         MVC   0(79,R12)GATXCOMM                                  00273326
                MVI   79(R12),X'15'                                      00273432
                BAL   R10,TAGS                                           00273526
                                                                         00273626
                CLI   COMADECP,C'0'                                      00283126
                BNH   NODECP                                             00283226
                                                                         00283326
DOCHARP         MVC   DECIN,0(R6)                                        00283426
                BAL   R9,DECROUT                                         00283526
                                                                         00283726
                L     R15,FWORD                                          00283826
                AR    R12,R15
                00283926
                LA    R12,9(R12)                                         00284026
                LA    R14,1(R14)                                         00284126
                AR    R14,R0                                             00284226
                B     MOVEOVER                                           00284326
```

```
                                                            00284426
NODECP     EX     R15,MOVEDATO                              00284526
           B      MOVEOVER                                  00284626
                                                            00284726
DOPACKED   EQU                                              00284826
           MVZ    NUMCHECK(2),COMAOLEN                      00284926
           CLC    NUMCHECK(2),NUMZONE                       00285026
           BNE    USEPLEN2                                  00285126
           CLC    COMAOLEN,NUMZONE                          00285226
           BH     OLENOK                                    00285326
USEPLEN2   MVC    COMAOLEN,COMAPLEN                         00285426
OLENOK     EQU                                              00285526
           PACK   DOUBLE,COMAPLEN                           00285626
           CVB    R15,DOUBLE                                00285726
           BCTR   R15,0                                     00285826
           B      SKIPUP
           00285926
UNPKPACK   UNPK   SPADSKEY(15),0(*-*,R6)                    00286026
                                                            00286134
SKIPUP            EX       R15,UNPKPACK
      00286226
           OI     SPADSKEY+14,C'0'                          00286326
           PACK   DOUBLE,COMAOLEN                           00286434
           CVB    R15,DOUBLE                                00286526
           BCTR   R15,0                                     00286626
                                                            00286726
           LA     R2,SPADSKEY                               00286826
           LA     R2,15(R2)                                 00286926
           SR     R2,R15                                    00287034
           BCTR   R2,0                                      00287126
                                                            00287226
           CLI    COMADECP,C'0'                             00287326
           BNH    NOPDEC                                    00287426
           LA     R2,1(R2)                                  00287526
           BCTR   R15,0                                     00287626
           EX     R15,UNPKDATP                              00287726
                                                            00287826
           STH    R15,MOVELENG                              00287926
           ST     R14,MOVEADDR                              00288026
           MVC    DECIN,0(R2)                               00288126
           CLI    COMAFTYP,C'B'                             00288826
           BE     DIBINARY                                  00295626
                                                            00295726
           ST     R15,FWORD                                 00295826
           PACK   DOUBLE,COMAPLEN                           00295926
           CVB    R15,DOUBLE                                00296026
           BCTR   R15,0                                     00296126
                                                            00296226
           CLI    COMADECP,C'0'                             00296326
           BNH    NODICP                                    00296426
           STH    R15,MOELENG                               00296526
           ST     R12,MOVEADDR                              00296626
           MVC    DECIN,0(R6)                               00296726
           BAL    R9,DECROUT                                00296826
                                                            00296926
           L      R15,FWORD                                 00297026
           AR     R12,R15
           00297126
           LA     R12,9(R12)                                00297226
           B      ENDTD                                     00297326
                                                            00297426
```

```
NODICP      EX     R15,MOVEDITO                                               00297526
            AR     R12,R15
            00297626
            LA     R12,1(R12)                                                 00297726
            MVI    0(R12),X'15'                                               00297826
            LA     R12,1(R12)                                                 00297926
            B      NOSERRS                                                    00298026
                                                                              00298126
DECROUT     EQU                                                               00298226
            MVC    DECOUT,7(R14)
            00298326
            PACK   DOUBLE,COMADECP GET # OF DEC PLACES
            00298426
            CVB    R0,DOUBLE     PUT IN DOUBLE WORD                           00298526
            EX     R15,MODEDECP        MOVE TO TEMP AREA SPAD24
            00298626
            SR     R15,R0              GET LENGTH OF NON DEC PART             00298726
            EX     R15,MODEDEC2        MOVE IT OUT                            00298826
            LA     R14,DECOUT                                                 00298926
            LR     R1,R14              SETUP REG 1                            00299026
            LA     R1,1(R1)            SKIP OVER HEADER                       00299126
            AR     R1,R15              ADD NON DEC LEN                        00299226
            STH    R15,HALFWORD        SAVE THIS ADDRESS                      00299306
            MVI    0(R1),C'.'          MOVE IN DEC POINT                      00299426
            LA     R1,1(R1)            POINT TO DEC AREA                      00299526
            LA     R15,SPAD24          DATA IS IN SPAD24                      00299626
            AH     R15,HALFWORD        ADD NON DEC LEN                        00299726
            LA     R15,1(R15)          SKIP OVER DEC POINT
            00299826
            ST     R14,AWORD           SAVE THIS ADDRESS                      00299926
            LR     R14,R0              GET # DEC PLACES                       00300026
            EX     R14,MODEDECO        MOVE FROM SPAD24 TO OUTPUT             00300126
            L      R14,AWORD           RELOAD R14                             00300226
            AR     R1,R0               POINT TO END OF AREA                   00300326
            MVI    0(R1),X'15'         LINE FEED                              00300426
            LH     R15,MOVELENG                                               00300526
            LA     R15,1(R15)                                                 00300626
            LA     R15,2(R15)                                                 00300726
            L      R14,MOVEADDR                                               00300826
            EX     R15,MODEMOVE                                               00300926
DECROVER    BR     R9                                                         00301026
MODEMOVE    MVC    7(*-*,R14),DECOUT                                          00301126
MODEDEC2    MVC    DECOUT(*-),SPAD24                                          00301226
MODEDECO    MVC    0(*-*,R1),0(R15)
     00301326
                                                                              00301426
COLORS      CLI    COMACOLR,C' '                                              00301526
            BNH    NOCOLR                                                     00301626
            MVC    QOUT(13),=C'<RONT COLOR=" '                                00301726
CKRED       CLI    COMACOLR,C'R'                                              00301826
            BNE    CKBLUE                                                     00301926
            MVC    QOUT+13(05),=C'RED">'                                      00302026
            B      COLRD                                                      00302126
CKBLUE      CLI    COMACOLR,C'B'                                              00302226
            BNE    CKGREEN                                                    00302326
            MVC    QOUT+13(06),=C'BLUE">'                                     00302426
            B      COLRD                                                      00302526
            BCTR   R15,0                                                      00302626
                                                                              00302726
            UNPK   SPADSKEY(9),DOUBLE2                                        00302826
```

```
              OI     SPADSKEY+8,C'0'                                   00302926
              LA     R2.SPADSKEY                                       00303026
              LA     R2,9(R2)                                          00314926
              SR     R2,R15                                            00315026
              BCTR   R2,0                                              00315126
              EX     R15,UNPKDITO
              00315226
              AR     R12,R15
              00315326
              LA     R12,1(R12)                                        00315626
              MVI    0(R12),X                                          00315726
              LA     R12,1(R12)                                        00315826
              B      NOSERRS                                           00315026
                                                                       00316026
NOMOVER       LA     R14,7(R14)                                        00316126
              B      AMOVER                                            00316226
MOVER         AR     R14,R15
      00316326
              LA     R14,,8(R14)        OFFSET OF 7 + ADJ OF 1         00316426
AMOVER        MVC    0(2,R14),=C' " '                                  00316526
              BAL    R10,TAGC                                          00316626
                                                                       00316726
              MVC    00(25,R12),=C'SIZE="--" MAXLENGTH="--"> '         00316826
              MVZ    NUMCHECK(2),COMAOLEN                              00316926
              CLC    NUMCHECK(2),NUMZONE                               00317026
              BNE    USEPLEN                                           00317126
              CLC    COMAOLEN,NUMZONE                                  00317226
              BH     OLENOK2                                           00317326
USEPLEN       MVC    06(2,R12),COMAPLEN                                00317426
              MVC    21(2,R12),COMAPLEN                                00317526
              B      LENDONE                                           00317626
OLENOK2       MVC    06(2,R12),COMAOLEN                                00317726
              MVC    21(2,R12),COMAOLEN                                00317826
LENDONE       MVI    QOUT+25,X'15'                                     00317926
              CLC    06(2,R12),=C'01'                                  00318026
              BNE    NOT01                                             00318126
              MVC    06(2,R12),=C'02'                                  00318226
NOT01         EQU                                                      00318326
              MVI    25(R12),X'15'                                     00318426
              BAL    R10,TAGC                                          00318526
                                                                       00318626
              MVC    0(5,R12),=C'</TD'                                 00318726
              BAL    R10,TAGC                                          00318826
                                                                       00318926
              BAL    R10,ERROUT                                        00319026
                                                                       00319126
              CLI    COMAERET,C'E'                                     00319226
              BNE    NOSERRS                                           00319326
              MVC    QOUT(38),=C'<td><IMG SRC'"/ourXXXXxxxx.GIF"></td>' 00319426
              MVC    0(09,R12),=C'</OPTION>'                           00319526
              MVI    9(R12),X'15'                                      00319626
              L      R12,SAVE12                                        00319726
              BAL    R10,TAGC                                          00319826
                                                                       00329726
              LA     R14,SPADSKEY
              00329826
              PACK   DOUBLE,19(4,R4)                                   00329926
              CVB    R1,DOUBLE                                         00330026
              AR     R14,R1                                            00330126
              BCTR   R14,0                                             00330226
              IC     R15,0(R14)                                        00330326
```

```
                 LA     R15,1(R15)                                                   00330426
                 STC    R15,0(R14)                                                   00330526
                 B      DDREAD                                                       00330626
                                                                                     00330726
OPTOVER          EQU                                                                 00330826
ENODOPT          EQU                                                                 00330926
                 L      R0,DD0                                                       00331026
                 L      R1,DD1                                                       00331126
                 L      R14,DD14                                                     00331226
                 L      R15,DD15                                                     00331326
                 BR     R2                                                           00331426
                                                                                     00331526
MOVEVAL          MVC    0(*-*,R12),0(R9)
      00331626
MOVEDISP         MVC    0(*-*,R12),0(R9)
      00331726
MOVEOKEY         MVC    SPADSKEY(*-*),0(R9)                                          00331826
CHEKDDS          CLC    0(*-*,R14),R6                                                00331926
                                                                                     00332026
ERRROUT          EQU                                                                 00332126
                 MVI    COMASERR,C' '                                                00332226
                 MVC    COMAERET,BLANKS                                              00332326
                                                                                     00332426
                                                                                     00332526
                                                                                     00332626
                                                                                     00332726
                                                                                     00332826
                                                                                     00332926
                 L      R14,COMAUP14                                                 00333026
                 L      R15,COMAUP15                                                 00333126
                 L      R1,COMAUP                                                    00333226
                 ZAP    THISSEG,                                                     00333326
                                                                                     00333426
                 STH    R14,HALFWORD          SAVE LENGTH OF TARGET FIELD            00333526
         L       R6,COMAMVAR   POINT TO BEGINNING OF INCOMMING DATA                  00333626
                 L      R1,COMAMVLN           GET TOTAL LENGTH OF THE DATA           00333726
                 MVC    FINDFLDT,BLANKS                                              00333826
                                                                                     00333926
QUELLOOP         EQU                                                                 00334026
                                                                                     00334126
                 CLC    COMAUSEG,=X'000000'                                          00334226
                 BE     SAVR6F                                                       00334326
                 CP     COMAUSEG,=P'0'                                               00334426
                 BE     SAVR6F                                                       00335003
                 B      CKFNDF                                                       00340003
SAVR6F           MVI    FOUNDIT,C'Y'                                                 00350003
                                                                                     00360003
                                                                                     00700003
                                                                                     00710003
TAGC             EQU                                                                 00720003
TAGS             EQU                                                                 00721024
                                                                                     00730003
NORES            C      R12,COMAQEND                                                 00740003
                 BNL    TAGENDC                                                      00750003
                 AP     TAGCNT,=P'1'                                                 00760003
                 AH     R12,COMAQLLN                                                 00770003
                 B      NOTAGC                                                       00780003
                                                                                     00790003
                 LH     R14,COMAQLLN                                                 00800003
RESR12                  CLI     0(R12),X'25'
```

```
        00810003
               BE      RESDONE                                                00820003
               CLI     0(R12),X'15'                                           00830003
               BE      RESDONE                                                00840003
               CLI     0(R12),C' '                                            00850003
               BH      RESDONE                                                00860003
               BCTR    R12,0                                                  00870003
               BCT     R14,RESR12                                             00880003
               B       NOTAGC                                                 00890003
RESDONE        EQU     *                                                      00900003
               LA      R12,1(R12)                                             00910003
                                                                              00920003
NOTAGC         BR      R10                                                    00930003
                                                                              00940003
TAGENDC        AH      R12,COMAQLLN                                           00950003
               MVI     COMACONT,C'Y'                                          00960003
               EXEC CICS LINK PROGRAM('RAMI0100')COMMAREA(COMMAREA)           00970003
                            LENGTH(COMACOML)                                  00980003
               MVI     COMACONT,C' '                                          00990003
                                                                              01000003
               L       R0,COMAQADD        POINT REG 0 TO SEGMENTS             01010003
               LH      R1COMAQLEN         LOAD REG 1 WITH SEGMENT LENGTH
               01020003
               SR      R15,R15                   SET LENGTH TO ZERO
               01030003
               IC      R15,=C' '          SET PAD CHARACTER TO BLANK          01040003
               SLA     R15,24             MOVE PAD CHARACTER TO BITS 1-8      01050003
               LA      R14,*              R14 MUST BE A VALID ADDRESS         01060003
               MVCL    R0,R14       MOVE PAD CHAR FOR LENGTH OF SEG           01070003
                                                                              01080003
               CLI     COMAQERR,C'Y'             SUCCESSFUL CREATE?           01090003
               BE      ERROR
               01100003
                                                                              01110003
               L       R12,COMAQADD                                           01120003
               MVI     COMACONT,C' '                                          01130003
                                                                              01140003
               B       NOTAGC                                                 01150003
                                                                              01160003
                                                                              01170003
                                                                              01180003
ERROR                  EQU
        01190003
               MVI     COMAERRF,C'Y'                                          01200003
               MVI     COMASERR,C'Y'                                          01210003
               BR      R10            GOBACK                                  01220003
                                                                              01230003
RETURN         EQU                        SFW001
        01240003
                                                                              01241003
               MVC     COMAOLEN,BLANKS                                        01242003
               MVC     COMAKEYE,BLANKS                                        01243003
               MVI     COMACOLR,C' '                                          01244003
               MVI     COMADECP,C' '                                          01245003
               ZAP     COMARDMX,RDMAX                                         01245103
               ZAP     COMARDCT,RDCNT                                         01245203
               ZAP     COMATGMX,TAGMAX                                        01245303
               ZAP     COMATGCT,TAGCNT                                        01245403
               ST      R12,COMAUP01                                           01245503
                                                                              01245603
               EXEC    CIS RETURN                                             01245703
```

```
                                                                   01245803
                                                                   01245903
                      CONSTANTS                                    01246003
                                                                   01247003
ASIS        DC    C'N'    Y=NO UPPER/LOWER CASE TRANSLATION        01248003
BLANKS      DC    CL133' '                                         01249003
HEXZERO     DC    30X'00'                                          01250003
NUMZONE     DC    24C'0'                                           01260003
HEXFF       DC    30X'FF'                                          01270003
                                                                   01280003
CKTR        TR    0(*-*,R6),UPCASE      TRANSLATE TO UPPER CASE    01281003
UPCASE      DC    X'000102030405060708090A0B0C0D0E0F'              01282003
            DC    X'101112131415161718191A1B1C1D1E1F'              01283003
            DC    X'202122232425262728292A2B2C2D2E2F'              01284003
            DC    X'303132333435363738393A3B3C3D3E3F'              01285003
            DC    X'404142434445464748494A4B4C4D4E4F'              01286003
            DC    X'505152535455565758595A5B5C5D5E5F'              01287003
            DC    X'606162636465666768696A6B6C6D6E6F'              01288003
            DC    X'707172737475767778797A7B7C7D7E7F'              01289003
            DC    X'80C1C2C3C4C5C6C7C8C98A8B8C8D8E8F'              01290003
            DC    X'90D1D2D3D4D5D6D7D8D99A9B9C9D9E9F'              01300003
            DC    X'A0A1E2E3E4E5E6E7E8E9AAABACADAEAF'              01310003
            DC    X'B0B1B2B3B4B5B6B7B8B9BABBBCBDBEBF'              01320003
            DC    X'C0C1C2C3C4C5C6C7C8C9CACBCDCECF'                01330003
            DC    X'D0D1D2D3D4D5D6D7D8D9DADBDCDDDEDF'              01340003
            DC    X'E0E1E2E3E4E5E6E7E8E9EAEBECEDEEEF'              01350003
            DC    X'F0F1F2F3F4F5F6F7F8F9FAFBFCFDFEFF'              01360003
                                                                   01370003
            DS    OH                                               01380003
                                                                   01390003
                                                                   01400003
            LTORG                                                  01410003
            END   RAMI1T00                                         01420003
```

APPENDIX G

ENTRY PONT IS: I1S00

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```
                  COMMAREA DSECT
                  EVENTUAL COMMAREA FOR THIS MODULE
                           COPY RARAMDAS
                           USING RARAMDAS,R9
                           COPY RAMICOMM
                           USING COMMAREA,R5
                           COPY RARAMIDP
                           COPY RARATCPB
                                    DEFINITION OF REGISTERS
                           COPY RARAREGS
                                    CICS EXEC INTERFACE DYNAMIC STORAGE AREA DSECT
                           DFHEISTG
                           COPY RARASPAD
SAVETRAN        DS         CL4
NORESPND        DS         C
                           WORK AREAS
WORKD           DS         D       --      DOUBLE WORD CITATION NUMBER
WORKD2          DS         D       --      DOUBLE WORD MESSAGE NUMBER
WORKF           DS         F       --      FULLWORD WORK AREA
TEMPTLEN        DS         F       --      FULLWORD WORK AREA
         TEMPORARY STORAGE CONTROL
DSTSITM#        DS         H       B       ITEM NUMBER OF ENTRY IN QUEUE
DSTSLEN         DS         H       B       TEMPORARY STORAGE DATA AREA LENGTH
DSTSITPL        DS         H       B       ITEM NUMBER OF BIB 4 PACLINK
DSTSDAAD        DS         A       ACON    TEMPORARY STORAGE DATA AREA ADDRESS
DSTSNAME        DS         CL8     AN      TEMPORARY STORAGE QUEUE NAME
         PROGRAM CONTROL.
DSPCCALN        DS         H       B       COMMUNICATIONS AREA LENGTH
DSPCNAME        DS         CL8     AN      PROGRAM NAME
DSPCSAVE        DS         15F     AN      REGISTER SAVE AREA
SAVER14         DS         A               SAVE R14 ADDRESS
SAVER14A        DS         A               SAVE R14 ADDRESS
DSR14SAV        DS         A               SAVE R14 ADDRESS
         STORAGE CONTROL
DSSCLEN         DS         H       B       STORAGE LENGTH
DSSCAD          DS         A       ACON    STORAGE ADDRESS
DSNXTPOS        DS         A               A(NEXT POSITION IN BUFFER)
DSSNDADD        DS         A               A(SEND BUFFER)
DSSNDEAD        DS         A               A(END OF BUFFER)
DSRECEND        DS         A               A(END OF RECORD)
DSSNDLEN        DS         H               LENGTH(SEND BUFFER)
DSDEST          DS         255C            DESTINATION
DSDSTLN         DS         H               LENGTH(DESTINATION)
         NEW DATE STUFF
DSUTIME         DS         PL8             TIME FOR ASKTIME CALL
DSDOM           DS         F               DAY OF MONTH
DSDOW           DS         F               DAY OF WEEK
DSMOY           DS         F               MONTH OF YEAR
DSYEAR          DS         F               YEAR
DSDATE          DS         CL10            DATE
DSAPPL          DS         CL8             APPLID
DSTIME          DS         CL10            TIME
DSJC            DS         CL72            JOB STATEMENT
```

```
DSTRYCNT   DS    PL2        RETRY COUNT FOR HOST RESPONSE
DSCRFLAG   DS    C          CARRIAGE RETURN LINE FEED FLAG
FTEMP      DS    F          TEMPORARY FULL WORK

                 TCP-I STUFF
*
DSNCOMM    DS    OF         COMM AREA FOR EZACIC25(GETHOSTBYNAME
DSRETCOD   DS    F          RETURN CODE FROM GETHOSBYNAME CALL
DSERRNO    DS    F          ERROR NUMER
HOSTENT    DS    A          ADDRESS OF HOSTENT STRUCTURE
DSNCMND    DS    CL4        REQUESTED OPERATION (GHBN)
DSNAMLEN   DS    F          LENGTH OF NAME TO LOOK UP
DSNQTYPE   DS    CL1        TYPE OF QUERY
CSHFIRST   EQU   0          USE CACHE FIRST THEN GETHOSTBYNAME
DSNONLY    EQU   1          DO GETHOSTBYNAME CALL ONLY
CSHONLY    EQU   2          ATTEMPT QUERY USING CACHE ONLY
DSHNAME    DS    CL256      HOST NAME TO LOOK UP
DSNCOMM$   EQU   *-DSNCOMM
*
TCPINPUT   DS    OF         INPUT FROM THE TCP/IP LISTENER
SOCKDESC   DS    F          SOCKET DESCRIPTOR
MVSADDR    DS    CL8        MVS ADDRESS SPACE IDENTIFIER
TCPTASK    DS    CL8        TCP/IP TASK IDENTIFIER
DATAAREA   DS    CL35       CLIENT DATA AREA
FILLER     DS    C          FILLER
SOCKADDR   DS    OF         SOCKET ADDRESS
FAMILY     DS    H          TCP/IP ADDRESSING FAMILY
PORT       DS    H          PORT DESCRIPTION
ADDRESS    DS    F          IP ADDRESS
DZERO      DS    XL8        RESERVED (MUST BE ZEROS)
TCPIN$     EQU   *-TCPINPUT
PARMLIST   DS    30A
SOCFUNC    DS    CL16       SOCKET FUNCTION NAME
SOCRECV    DS    H          SOCKET DESCRIPTOR
PROTO      DS    F          SOCKET PROTOCOL
SOCTYPE    DS    F          SOCKET TYPE 1=STREAM,2=UDP
RETCODE    DS    F          RETURN CODE
ERRNO            DS    F          ERROR NUMBER
NBYTES     DS    F          SIZE OF BUFFER FOR SOCKET READ
FLAGS      DS    F          FLAGS FOR SOCKET CALLS
NAME       DS    OF         SOCKET ADDRESS
NFAMILY    DS    H          TCP/IP ADDRESSING FAMILY
NPORT      DS    H          PORT DESCRIPTION
NADDRESS   DS    F          IP ADDRESS
NDZERO     DS    XL8        RESERVED (MUST BE ZEROS)
CLNTHNDL   DS    H          SOCKET DESCRIPTOR OF CLIENT MACHINE
MAXSOC     DS    H          MAX. NUM OF SOCKETS OPEN AT ONE TIME
MAXNOS     DS    F          HIGHEST SOC NUM ASSIGNED TO APP.
AF         DS    F          ADDRESSING FAMILY (MUST = 2)
SUBTASK    DS    CL8        SUBTASK IDENTIFIER
BUF        DS    CL160      BUFFER FOR SOCKET WRITE
INBUF      DS    CL160      BUFFER FOR SOCKET READ
*SELECT CALL VARIABLES
OPTVAL     DS    OD
OPTVONOF   DS    F
OPTVLEN    DS    F
OPTNAME    DS    F
TIMEOUT    DS    OD
TIMEOUTS   DS    F
TIMEOUTM   DS    F
RSNDMSK    DS    F          READ SEND MASK
```

APPENDIX D

```
          TSO FOREGROUND HARDCOPY              (RAMI0300)
          DSNAME=RA.PATNET
          RAMI0300 TITLE 'STATE MANAGEMENT FOR MIDAS'

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          SUBROUTINE RAMI0300
          ---------------------------
          FUNCTION:
          EVALUATE DATA FROM TCP/IP REQUEST
          CREATE A NEW STATE KEY OR VALIDATE THE ONE THAT IS IN DATA

          DSECTS
                    DSECT
                    COPY RAMICOMM
                    COPY RARAMDAS
                    COPY RARMIDP
                    USING RARAMIDP,R12
MAXTRIES            EQU    10
          COPY REGISTER DEFINITION
                    COPY RAREGS
DYNAMIC STORAGE
          TEMP STORAGE HERE
                    DFHEISTG
                    COPY   RARSPAD
COMLTH              DS     H
CMLENGTH            DS     H
SAVETRY             DS     H
NUMCHEK             DS     CL15
UNPKTIME            DS     CL15
MIDASSTE            DS     CL8
UPDATE              DS     C
TIMEOUT1            DS     PL4
TIMEOUT2            DS     PL4
TCPDSTAT            DS     OCL16
TCPDSTTN            DS     CL8
TCPDSSTTE           DS     CL8
FINDFLD             DS     CL8
FINDFLDT            DS     CL79
UPDATEM             DS     C
FACTSREQ            DS     C
SAVETOPC            DS     CL10
SAVEPROF            DS     C
SAVEMVAR            DS     CL4
SAVEMVLN            DS     CL4
SAVEEXSS            DS     CL10
SAVEPROC            DS     CL10
STUID               DS     CL20

PROGRAM RAMI0300 STARTS HERE
RAMI0300        DFHEIENT CODEREG=R,8)
RAMI0300        AMODE 31
RAMI0300        RMODE ANY
                EXEC CICS HANDLE CONDITION DSIDERR(ERROR)
                      ERROR(ERROR) TERMIDERR(ERROR) SYSIDERR(ERROR)
                      ISCINVREQ(ERROR) INVREQ(ERROR) IOERR(ERROR)
                      DISABLED(ERROR) ILLOGIC(ERROR) LENGERR(ERROR)
                    NOTAUTH(ERROR) DUPREC(NOMDAS)
        EXEC CICS HANDLE CONDITION NOTFND(NOMDAS) NOTOPEN(ERROR)
START          EQU
               CLC     EIBCALEN,=H'0'
               BNH     RETURN2
               L       R9,DFHEICAP
               USING   RARAMDAS,R9
               LA      R5,MDASLEN             GET LENGTH FOR TOP OF MDAS
               AR      R5,R9                  ADD IT TO R9
               USING   COMMAREA,R5

               MVC     COMLTH,COMACOML        SAVE COMACOML
               SR      R14,R14                CLEAR REG
               LA      R14,MDASLEN            GET LENGTH FOR TOP OF MDAS
               AH      R14,COMLTH             ADD TO GET TOTAL NEEDED
               STH     R14,CMLENGTH           SAVE IT
               SPACE
               LH      R14,=H'10'
               LA      R15,SAVEPROC           PUT DATA HERE
               MVC     COMAFNDF,=C'PROCESS'      DATA IDENTIFIER
               BAL     R4,GETDATA             GO GET IT
               CLC     SAVEPROC,BLANKS
               BNH     NOSTATE                YES, CONTINUE

               EXEC CICS HANDLE CONDITION NOTFND(NOTPROC) NOTOPEN(NOTPROC)

               LH      R14,=H'20'
               LA      R15,STUID              PUT DATA HERE
               MVC     COMAFNDF,=C'STUID '       DATA IDENTIFIER
               BAL     R4,GETDATA             GO GET IT
               MVI     COMAFTYP,C'U'
               LA      R14,9                  PUT DATA HERE
               LA      R15,SAVEEXSS           PUT DATA HERE
               MVC     COMAFNDF,=C'MDASSTID'
               BAL     R4,GETDATA             GO GET IT

               MVI     COMAFTYP,C'U'
               LA      R14,9                        PUT DATA HERE
               LA      R15,SAVEEXSS           PUT DATA HERE
               XC      NUMCHEK,NUMCHEK

               !!!! HARD CODED TIMEOUT1 FOR NOW AT 5 MINUTES!!!!
               CLI     TCPDSTTE,C'M'
               BNE     NOMDAS
               ---------READ FILE FOR STATE CHECK---------

               EXEC CICS READ DATASET('RAMDAS') SET(R2)
                       LENGTH(HALFWORD) RIDFLD(TCPDSTTE)UPDATE
               CLC     CMLENGTH,HALFWORD          MAKE SURE LENGTH IS OK
               BL      ERROR                      ERROR IF TOO LONG FOR AREA
               CLC     DOUBLE,DOUBLE2             I
               BH      TIMEOUTL                   IT HAS BEEN TOO LONG, START OVER
               BNH     CKCONTN                    NOT OVER, CONTINUE
               EXEC CICS START TRANSID('MI06')
               B       STARTOVR                   IT HAS BEEN TOO LONG, START OVER
CKCONTN        EQU
               CLC     SAVEXSS,BLANKS             WAS A NEW SSN ENTERED?
               BNH     NONSSN                     NO, CONTINUE
               MVC     COMAEXSS(9),SAVEEXSS       YES, PUT IT IN COMMAREA
NONSSN         CLC     COMASIGN,=C          ADMINISTRATIVE USER?
```

```
WSNDMSK    DS    F           WRITE SEND MASK
ESNDMSK    DS    F           EXCEPTION SEND MASK
RRETMSK    DS    F           READ RETURN MASK
WRETMSK    DS    F           WRITE RETURN MASK
ERETMSK    DS    F           EXCEPTION RETURN MASK
SMAXSOC    DS    F           LARGEST SCK. DES,. + 1
SR1        DS    F           SAVE R1
SAVEQLEN   DS    H           QUEUE LENGTH
SAVEQITE   DS    H           QUEUE ITEM NUMBER
CODE       DS    H           STARTCODE
COMMLEN    DS    H           INCOMMING COMMAREA LENGTH
FROMTCP    DS    C           STARTED FROM TCP/IP REQUEST
GOTPROC    DS    C           GOT A PROCESS READ
SAVER6     DS    F           SAVE REG 6
SAVER15    DS    F           SAVE REG 15
DATALENG   DS    F           LENGTH OF DATA FIELDS
GOTDATA    DS    C           LENGTH OF DATA FIELDS
PLACE      DS    PL1         LENGTH OF DATA FIELDS
WKLEN5     DS    CL5         CHARACTER FIELD FOR BUFFER LENGTH
WKLEN6     DS    CL6         CHARACTER FILED FOR BUFFER LENGTH
*
EMAILTO1   DS    CL79        1ST RECP EMAIL ADDRESS
EMAILTO2   DS    CL79        2ND RECP EMAIL ADDRESS
EMAILTO3   DS    CL79        3RD RECP EMAIL ADDRESS
EMAILTO4   DS    CL79        4TH RECP EMAIL ADDRESS
EMAILTO5   DS    CL79        5TH RECP EMAIL ADDRESS
EMAILFROM  DS    CL79        EMAIL ADDRESS OF SENDER
EMAILSUB   DS    CL79        EMAILSUBJECT LINE

MAINLINE   DS    OH
           EXEC  CICS ASSIGN STARTCODE(CODE)
           CLC   CODE,=C'SD'
           BNE   STARTXCT
           EXEC  CICS RETRIEVE SET(R5) LENGTH(COMMLEN)
           MVC   EIBCCLEN,COMMLEN  UPDAT EIBCALEN
           B     GOTAREA

STARTXCT   EQU
           L     R5,DFHEICAP        LOAD ADDR COMM.AREA
           CLC   EIBCALEN,=H'0'     COMMAREA GREATER THAN 0
           BNH   RETURN
GOTAREA    EQU
           CLC   EIBALEN,COMACOML
           BL    RETURN
           UNPK  COMAMQNM,EIBTASKN        COPY TD QUEUE PREFIX
           OI    COMAMQNM+7,C'0'
           BNH   RETURN
           BAL   R14,IPAD2BIN

CKRPORT    LA    R14,5
           LA    R15SAVEPORT                  PUT DATA HERE
           MVC   SAVEPORT,BLANKS
           MVC   COMAFNDF,=C'PORTNUMB'  DATA IDENTIFIER
           BAL   R4,GETDATA             GO GET IT


           CLC   SAVEPORT,BLANKS
           BNH   RETURN
           PACK  DOUBLE,SAVEPORT
           CVB   R14,DOUBLE
           STH   R14,NPORT
```

```
CKRINIT    EQU   *
           XC    SAVEINIT,SAVEINIT
           LA    R14,50
           ST    R14,SAVELINI               INIT THE INIT STRING TO 50
           LA    R15,SAVEINIT               PUT DATA HERE
           MVC   COMAENDE,=C'RETNDATA'      DATA IDENTIFIER
           BAL   R4,GETDATA                 GO GET IT
           CLC   SAVEINIT(50),BLANKS        WAS SOMETHING SENT?
           BL    RETURN                     NOT AT LEAST BLANKS, GET OUT
           BH    GOTINIT                    SOMETHING THERE, CONTINUE
           XC    SAVELINI,SAVELINI          NOTHING THERE, ZERO LENGTH
GOTINIT    EQU
           BAL   R14,GETBUG                 GETMAIN A BUFFER
           B     ATFGINFO

NOTMI2E    EQU

           BAL   R14,GETBUF                 GETMAIN A BUFFER
           BAL   R14,GETINFO                GET THE NECESSARY CALL INFO

AFTGINFO   EQU

      CONNECT TO COMMUNICATIONS SERVER
           MVI   DSCRFLAG,C' '              CLEAR<CR><LF> FLAG
           BAL   R14,CONNHOST

           CLC   NPORT,=H'25'
           BE    DOEMAIL

           BAL   R14,SENDIHDR

           BNE   CUTOFF                     NO, BYE
NOWAIT     MVC   COMAIBFN,=C'3'             SEND REGULAR MESSAGE
CUTOFF     MVI   SAVEWAIT,C'N'
           MVC   COMAPTAR,COMATOPC          SAVE TARGET REQUEST

           LR    R0,R9                      ADDRESS OF DATA
           AH    R0,=AL2(MDASLEN)           BUMP TO WHERE COMMAREA GOES
           LR    R14,R5                     ADDRESS OF COMMAREA
           LH    R15,COMACOML               LENGTH OF COMMAREA
           LR    R1,R15
           MVCL  R0,R14                     MOVE THE DATA
           LH    R15,COMACOML               LENGTH OF COMMAREA
           AH    R15,=AL2(MDASLEN)          ADD LENGTH OF COMMAREA
           STH   R15,HALFWORD               SAVE LENGTH OF DATA

REWRMDAS   EQU
           EXEC CICS REWRITE DATASET('RAMDAS')
                 LENGTH(HALFWORD) FROM(RARAMDAS)

           CLC   RETCODE,.DFHRESP(NOTFND)             WAS IT NOT FOUND
           BE    GOCLOS
           CLC   RETCODE,DFHRESP(NOTOPEN)       WAS NOT OPEN
           CLC   RETCODE,DFHRESP(DISABLED)      WAS IT DISABLED
           BE    GOCLOS
           CLC   RETCODE,DFHRESP(NORMAL)              WAS IT NORMAL
           BNE   RETURN
           B     GOCLOS
PUTCONT    MVC   COMAMESS(8),=C'CONTINUE'
           EXEC CICS UNLOCK DATASET('RAMDAS')
```

```
GOCLOS     EQU
           EXEC CICS DEQ RESOURCE (MIDASSTE) LENGTH(8) NOHANDLE
           BAL    R14.SENDCLOS
           B      RETURN

DOEMAIL    BAL    R14.SENDHELO

           BAL    R14,SNDMFROM

           BAL    R14.SNDMTO

           BAL    R14,SNDMDATA

           SR     R15,R15
           END TEST

IPAD2BIN   EQU
           ST     R14,SAVER14A
           LA     R14,SAVEIPAD
           LA     R15,NADDRESS
           ZAP    PLACE,=P'0'
MADDLOOP   CLI    1(R14),C'.'
           BE     ZAP1
           CLI    1(R14),C' '
           BE     ZAP1
           CLI    2(R14),C'.'
           BE     ZAP2
           CLI    3(R14),C'.'
           BE     ZAP3
           CLI    3(R14),C' '
           BE     ZAP3
           B      NOADDR
ZAP1       EQU    *
           PACK   HALFWORD,0(1,R14)
           LA     R14,2(R14)
           B      ZAPADDR
ZAP2       EQU    *
           PACK   HALFWORD,0(2,R14)
           LA     R14,3(R14)
           B      ZAPADDR
ZAP3       EQU    *
           PACK   HALFWORD,0(3,R14)
           LA     R14,4(R14)
           B      ZAPADDR
ZAPADDR    EQU    *
           ZAP    DOUBLE,HALFWORD
           CVB    R1,DOUBLE
           STH    R1,HALFWORD
PUTADDIN   EQU    *
           MVC    0(1,R15),HALFWORD+1
           LA     R15,1(R15)
           AP     PLACE,=P'1'
           CP     PLACE,=P'4'
           BL     MADDLOOP
NOADDR     EQU    *
           L      R14.SAVER14A
           BR     R14
      ROUTINE TO GETMAIN AN AREA TO BE USED TO BUILD MAIL MESSAGE

           SPACE 1
```

```
GOTMONTH  MVC   8(3,R2),4(R14)        MOVE IN THE MONTH TEXT
          MVC   12(4,R2),DSDATE+6     MOVE IN THE YEAR
          MVC   17(8,R2),DSTIME       MOVE IN THE TIME
          SPACE 1
          AP    WORKD2,=PL8'1'        MESSAGE NUMBER FOR SUBJECT LINE
          L     R2,DSNXTPOS           START OF BUFFER
          LA    R2,SUBJ(R2)           WHERE TO MESSAGE NUMBER
          MVC   1(10,R2),DSDATE       DATE FOR SUBJECT LINE
          MVC   12(8,R2),DSTIME       TIME FOR SUBJECT LINE
          MVC   21(5,R2),=C'Part'
          MVC   25(4,R2),=X'4021202020'       SET MASK
          ED    25(4,R2),WORKD2+6     CURRENT MESSAGE NUMBER
          L     R2,DSNXTPOS           START OF BUFFER
          LA    R2,DEST1@9R2)         WHERE TO WRITE DESTINATION
          LH    R15,DSDSTLN           LENGTH OF EMAIL ADDRESS
          LA    R4,DSDEST             A(DESTINATION)
          BCTR  R15,0                 DECREMENT FOR EXECUTE
          EX    R15,MOVEDEST          MOVE EMAIL ADDRESS
          AH    R2,DSDSTLN            LENGTH OF EMAIL ADDRESS
          MVI   0(R2),C'>'            CLOSE RCPT TO: FIELD
          L     R2,DSNXDEST           START OF BUFFER
          LA    R2,DEST2@(R2)               WHERE TO WRITE DESTINATION
          LH    R15,DSDSTLN           LENGTH OF EMAIL ADDRESS
          BCTR  R15,0                 DECREMENT FOR EXECUTE
          EX    R15,MOVEDEST          MOVE EMAIL ADDRESS
          BR    R14

          ROUTINE TO CONNECT TO SMTP.NERSP.NERDC PORT 25 VIA TCP/IP
CONNHOST  EQU
          ST    R1,SAVER14
          MVC   SOCFUNC,=CL16'SOCKET' SOCKET FUNCTION TO CALL
          MVC   AF,=F'2'              ADDRESSING FAMILY
          MVC   SOCTYPE,=F'1'               SET SOCKET TYPE TO STREAMS
          MVC   PROTO,=F'0'           USE DEFAULT PROTOCOL FOR STREAMS
          CALL  EZASOKET,(SOCFUNC,AF,
                SOCTYPE,PROTO,ERRNO,RETCODE),
                VL,MF=(E,PARMLIST)
          CLC   RETCODE,=F'-1'
          BE    LEOS                  ERROR
          TSO FOREGROUND HARDC'


                    MVC    SOCRECV,RETCODE+2          SOCKET HANDLE FROM SOCKET CALL
                    CLC    NADDRESS,=F'0'             CHECK TO SEE IF IP WAS SENT
                    BH     GOTIPADR                   YES, USE IT.
   LOOKUP THE IP ADDRESS OF EMAIL HOST (GETHOSTBYNAME)
                    USING  RARATCPB,R12               USE TCP BUFFER DSECT TO ADDRESS
                    MVZ    NUMCHECK96),COMATLEN       CHECK FOR NUMERIC IN TOTAL LENGTH
                    CLC    NUMCHECK(6),NUMZONE               "
                    BNE    SOCKERR                           "
                    PACK   DOUBLE,COMATLEN            PACK IT
                    CVB    R14,DOUBLE                 CONVERT TO BINARY
                    A      R14,=A(TCPBLEN)            ADD LENGTH OF CONTROL BUFFER
                    ST     R14,TEMPTLEN               SAVE IT
                    CVD    R14,DOUBLE                 CONVERT TO PACKED DEC
                    UNPK   COMATLEN,DOUBLE            UNPACK IT
                    OI     COMATLEN+5,C'0'            FIX LAST BYTE
                    CLI    COMAPROF,C'Q'              Creating a request
                    BE     BLDRQST                    Yes, do it
                    L      R12,COMACNTA               no, get the original cntl block
                    MVC    TCPBBLEN,COMATLEN          SET TOTAL LENGTH TO BE SENT
                    B      BLDRESP
   BLDRQST          LA     R12,CNTLBUF                SET ADDRESS OF AREA FOR SEND
                    MVC    CNTLBUF,BLANKS             INIT TO BLANKS
                    MVC    TCPBBLEN,COMATLEN          SET TOTAL LENGTH TO BE SENT
                    MVC    TCPBTRAN,SAVETRAN          SET TRANSACTION TYPE
                    MVC    TCPBSYST,=C'FEDI'          SET SYSTEM, FDET IMAG, ETC
                    MVI    TCPBCOMM,C'0'              SET COMPRESS METHOD
                    MVI    TCPBENC,C'0'               SET ENCRYPT METHOD
                    MVC    TCPBREQS,=C'FLACENTSERV'         SET REQUESTING SERVER
                    MVC    TCPBDATS,COMAFIC1          SET DATA HOST
                    MVC    TCPBREQN,=C'01'            SET REQUEST TYPE NUMBER
                    MVC    TCPBMESS,=C'01'            SET MESSAGE STATE
   BLDRESP          EQU
                    BAL    R14,SENDHOST               SENT TO THE HOST

                    L      R14,A=(TCPBLEN)            GET WHAT WAS SENT
                    L      R15,TEMPTLEN               GET REMAINING LENGTH
                    SR     R15,R14                    SUBTRACT WHAT IS WAS SENT
                    C      R15,=F'0'                  IS THERE MORE?
                    BE     NOMORED                    NO, DO NOT READ QUEUE
                    ST     R15,TEMPTLEN               SAVE WHAT IS LEFT
                    L      R12,DSSNDADD               SET ADDRESS OF AREA FOR SEND
                    ST     R12,COMAQADD               AREA TO BE FILLED BY READ
                    MVC    COMAQ2DO,=C'READ'          SET TO READ QUEUE
                    MVI    COMAQSTO                   PUT IN ALLOCATED AREA
                    MVC    COMAQKEY,COMAMQNM          SET TS QUEUE NAME
                    MVC    COMAQITE,=H'1'             SET TO ITEM 1
                    MVI    COMAQERR,C'N'              RESET QUEUE ERROR FLAG
   GETQ4SND         EQU
                    MVC    COMAQLEN,=AL2(MAXSNDLN)
                    EXEC CICS LINK PROGRAM('RARASOKY') COMMAREA(COMMAREA)
                           LENGTH(COMACOML)
                    CLI    COMAQERR,C'Y'              SUCCESSFUL READ?
                    BE     SOCKERR                    NO, GO TO ERROR
                    LH     R14,COMAQLEN               SAVE AMOUNT READ
                    ST     R14,NBYTES                 SET TO SEND WHAT WAS READ
                    L      R15,TEMPTLEN               GET REMAINING LENGTH
                    SR     R15,R14                    SUBTRACT WHAT IS BENIG SENT
          C      R15,=F'0'                  IS THIS THE LAST ONE?
          BNE    NOTLAST                    NO, DO NOT SET FLAG
          MVI    LASTSEND,C'Y'              SET LAST FLAG
NOTLAST   ST     R15,TEMPTLEN               SAVE WHAT IS LEFT
          BAL    R14,SENDHOST               SEND TO THE HOST
          LH     R14,COMAQITE               GET ITEM
          AH     R14,=H'1'                  ADD ONE
          STH    R14,COMAQITE               PUT NEXT ITEM NUMBER
          CLI    LASTSEND,C'Y'              WAS IT THE LAST ONE
          BNE    GETQ4SND                   NO, GET THE NEXT ONE
          BCT    R14,ENDLOOP
MOVEEND   MVI    1(R15),C'>'                END BRACKET
          BR     R1
BLANKR12  EQU
          ST     R1,SR1
          LA     R0,*                       MOVE BLANKS TO AREA
          LR     R14,R12                         |
          SR     R1,R1                           |
          ICM    R1,8,=C' '                      |
          LH     R15,=AL2(MAXSNDLN)              |
          MVCL   R14,R0                          |
          L      R1,SR1
          BR     R1
NULLR12   EQU
          ST     R1,SR1                     MOVE BLANKS TO AREA
          LA     R0,*
          LR     R14,R12                         |
          SR     R1,R1                           |
          ICM    R1,8,=X'00'                     |
          LH     R15,=AL2(MAXSNDLN)              |
          MVCL   R14,R0                          |
          L      R1,SR1
          BR     R1
SNDMTO    EQU
          ST     R14,SAVER14
          CLC    EMAILTO1,BLANKS
          BNH    SNDMTO2
          BAL    R1NULLR12
          MVC    NBYTES,=F'88'              LENGTH OF MESSAGE
          MVC    0(09,R12),TOMSG            FIRST PART OF MESSAGE
          MVC    09(79,R12),EMAILTO1        RECEIPIENT
          BAL    R1,FINDEND
          MVI    DSCRFLAG,C'Y'              SET <CR><LF> FLAG ON
          BAL    R14,SENDHOST               SENT TO THE HOST
          BAL    R14,HOSTRESP               WAIT FOR RESPONSE
SNDMTO2   EQU
          CLC    EMAILTO2,BLANKS
          BNH    SNDMTO3
          BAL    R1,NULLR12
          MVC    NBYTES,=F'88'              LENGTH OF MESSAGE
          MVC    0(09,R12), TOMSG           FIRST PART OF MESSAGE
          MVC    09(79,R12), EMAILTO2       RECEIPIENT
          BAL    R1,FINDEND
          MVI    DSCRFLAG,'Y'               SET <CR><LF> FLAG ON
          BAL    R14,SENDHOST               SEND TO THE HOST
          BAL    R14,HOSTRESP               WAIT FOR RESPONSE
          SEND THE MESSAGE HEADER AND GET THE RESPONSE FROM THE  HOST
          LA     R4,TOPHEAD#                NUMBER OF LINES IN THE HEADER
SENDHDR   MVC    NBYTES,=F'80'              LENGTH OF CARD IMAG
          BAL    R14,SENDHOST               SEND TO THE HOST
          S      R10,=F'80'                 SUBTRACT FROM LENGTH
          BAL   R14,HOSTRESP              WAIT FOR RESPONSE
          LA    R3,80(R3)                 NEXT CARD IMAGE
          BCT   R4,SENDHDR                LOOP TILL END OF HEADER
          SPACE 1
SEND THE REST OF THE MESSAGE WITHOUT GETTING A RESPONSE FROM THE HOST
SNDREST   EQU
          ST    R10,NBYTES                NUMBER OF BYTES TO SEND
          MVC   SOCFUNC,=CL16'SEND        SOCKET FUNCTION = SEND
          MVC   FLAGS,=F'0'               CLEAR FLAG VARIABLE
          CALL  EZACIC04,((R3),NBYTES),VL,MF=(E,PARMLIST) TRANS, TO ASCII
          SPACE
          CALL  EZASOKET,(SOCFUNC,SOCRECV,FLAGS,
                NBYTES,(R3),ERRNO,RETCODE),
                VL,MF=(E,PARMLIST)
          SPACE
          L     R1,RETCODE
          CLC   R1,=F'-1'                 POSITIVE RETURN CODE?
          BE    LEOS                      NO, MUST BE AN ERROR
          BAL   R14,HOSTRESP              WAIT FOR RESPONSE
          SPACE
          L     R14,SAVER14               RESTORE RETURN REGISTER ADDRESS
SEND QUIT COMMAND TO HOST
SENDQUIT  EQU
          ST    R14,SAVER14               RESTORE RETURN REGISTER ADDRESS
          MVC   0(1,R3),=C'QUIT'          MOVE IN QUIT COMMAND
          MVC   NBYTES,=F'4'              LENGTH OF COMMAND
          MVI   DSCRFLAG,C'Y'             SET <CR><LF> FLAG ON
          BAL   R14,SENDHOST              SEND TO THE HOST
          BAL   R14,HOSTRESP              WAIT FOR RESPONSE
          L     R14,SAVER14               RESTORE RETURN REGISTER ADDRESS
          BR    R14                       RETURN

SEND CHUNK OF THE MESSAGE TO THE HOST (ADDING CRLF)
SENDHOST  EQU
          ST    R14,DSR14SAV              SAVE RETURN REGISTER
          MVC   SOCFUNC,=CL16'SEND'       SOCKET FUNCTION = SEND
          MVC   FLAGS,=F'0'               CLEAR FLAG VARIABLE
          MVC   BUF,0(R12)                SEE WHAT'S GOING
TRANSEND  EQU

TRANSLATE TO ASCII WITH EZACIC04

          CALL  EZACIC04,((R12),NBYTES), VL,MF=(EPARMLIST) TRAN TO ASCII
          SPACE
          CLI   DSCRFLAG,C'Y'             <CR><KF> FLAG SET ?
          BNE   EZASEND                   NO, JUST SEND WHAT IS IN BUF
          SPACE
          L     R14,NBYTES                NUMBER OF BYTES
          AR    R14,R12                   BUMP POINTER PAST TEXT
          MVC   0(2,R14),=X'OD0A'         MOVE IN ASCII <CR><LF>
          L     R14,NBYTES                NUMBER OF BYTES
          SPACE

          CLC   RETCODE,NBYTES            DID SEND IT ALL
          BNL   SENTALL                   YES, CONTINUE
          CLC   RETCODE,=F'-1'            CHECK RETURN CODE
          BNH   LEOS                      TCP/IP ERROR
          L     R1,RETCODE                NUMBER OF BYTES SENT
          AR    R12,R1                    BUMP THE RECORD POINTER
          L     R1,NBYTES                 NUMBER OF BYTES INTENDED
          S     R1,RETCODE                SUBTRACT THE NUMBER SENT
```

```
               LTR    R1.R1                         TEST REGISTER
               BNP    R1.NBYTES                     IF NOT POSTIVE.ERROR
               ST     R1.NBYTES                     NUMBER OF BYTES STILL LEFT
               LH     R14.HALFWORD                  CHECK LOOP COUNT
               BCTR   R14,0                         DECREASE BY ONE
               LTR    R14.R14                       TEST REGISTER
               BNP    LEOS                          MAXIMUM TRIES DONE, ERROR
               STH    R14.HALWFWORD                 SAVE VALUE
               B      EZASEND                       GO SEND AGAIN
SENTALL        L      R14.DSR14SAV                  RESTORE RETURN REGISTER
               BR     R14                           RETURN

               READ RESPONSE FROM MAIL HOST
                            VL,MF=(E,PARMLIST)
                            SPACE
AFTSELT        EQU
               CLC    RSNDMSK,RRETMSK               CHECK READ RETURN MASK
               BE     READCALL                      GOT SOMETHING, GO GET IT
               CLC    RETCODE,=F'0'                 CHECK RETURN CODE
               BH     READCALL                      GO READ SOCKET
               CLC    RETCODE,=F'-1'                IS IT NEGATIVE 1
               BE     LEOS                YES, MUST BE A TCP/IP ERROR
               B      NORESPN
READCALL       MVC    SOCKFUNCK,=CL16'READ'         SOCKET FUNCTION = READ
               XC     INBUF,INBUF                   CLEAR BUFF
               MVC    NBTES,=ALL(L'INBUF)           LENGTH TO READ
               SPACE
               CALL   EZASOKET,(SOCFUNC,SOCRECV,
                      NBYTES,INBUF,ERRNO,RETCODE),
                      VL,MF=(E,PARMLIST)
               SPACE
               CLC    RETCODE,=F'0'                 DID WE GET ANYTHING?
               BE     NORESPN                       NO, MUST NOT BE SENDING ANYTHING
               BH     TRANRESP                      YES, GO TRANSLATE TO EBCDIC
               CLC    RETCODE,=F'-1'                IS IT NEGATIVE 1
               BE     LEOS                          YES, MUST BE A TCP/IP ERROR
               B      NORESPN
TRANRESP       EQU    *
               CALL   EZACICOS,(INBUF,RETCODE),VL,MF=(EPARMLIST) TRAN. EBCDIC

AFTRANS        EQU
               BE     LEOS                          YES, MUST BE A TCP/IP ERROR
               B      NORESPN
TRANRES        CALL   EZACICOS,((R12),RETCODE),VL,MF=(E,PARMLIST) TRAN, EBCDIC

AFTRAN         EQU
               MVC    BUF.0(R12)
NORESP         EQU
               MVI    NORESPND,C'Y'
HOSTREX        L      R14,DSR14SAV                  RESTORE RETURN REGISTER
               BR     R14                           RETURN

          ERROR ROUTINES

          LEOM DS     OH
               EXEC   CICS ABEND,         ABEND THIS TASK
                      ABCODE('LEOM'),
                      CANCEL
          LEOC EQU    *
GMAINERR       EQU    *
               MVC    LEM010RC,LEM010SG GETMAIN ERROR
```

```
                MVC     MESSAGE(13),=C'GETMAIN ERROR'
                B       RETURN
NOTFND          EQU
                MVC     MESSAGE(16,=C'RECORD NOT FOUND'
                B       RETURN
NOTOPEN         EQU     *
                MVC     MESSAGE (13),=C'FILE NOT OPEN'
                B       RETURN
LEOL            EQU     *
ERROR           EQU     *
PROGERR         EQU     *
*               MVC     LEM01ORC,LEM010LGPROGRAM LOGIC ERROR!
                MVC     MESSAGE(20),=C 'PROGRAM LOGIC ERROR!'
                B       RETURN
LEOS            EQU     *
SOCKERR         EQU     *
*               MVC     LEM010RC,LEM010SK TCP/IP SOCKETES ERROR
                MVI     COMAERRF,C'Y'
                MVC     MESSAGE(20),=C'TCP/IP SOCKETS ERROR!
                L       R15,ERRNO            LOAD THE ERROR NUMBER INTO R15

                B       RETURN
LEOW            EQU     *
QUEERR          EQU     *
*       MVC             LEM010RC,LEM010EEQ        TS QUEUE ERROR
                MVC     MESSAGE(14),=C'TS QUEUE ERROR'
RETURN          EQU     *
                EXEC CICS DEQ RESOURCE(MIDASSTE) LENGTH(8) NOHANDLE

                EXEC CICS RETURN

                CONSTANTS AND EXECUTED INSTRUCTIONS

                COPY   RAMIGETP
                LTORG
SAVEDEST        MVC    DSDEST(*-*),0(R4)
MOVEDET         MVC    0(*-*,R2),0(R4)
MOVELINE        MVC    0(*-*,R10),0(R4)
LOOKEXEC        TRT    0(-*,R4),CRTBL LOOK FOR A <CR> (NOTE: CLOBBERS R2)
MOVEBUF         MVC    0(*-*,R12),0(R3)       MOVE MESSAGE CHUNK TO BUFFER
MVBLANKS        MVC    0(*-*,R12),BLANKS
MAXSNDLN        EQU    32767

BLANKS          DC     CL256' '
NUMZONE         DC     CL2800000000000000000000000000000000'
PIN1111         DC     CL4'1111'
SUBJMSG         DC     CL80'SUBJECT'
FROMMSG         DC     CL80'MAIL FROM:<'
TOMSG           DC     CL80'RCPT TO:<'
HELLOMSG        DC     CL80'HLO NERMVS.NERDC.UFL.EDU'
HEADER          DC     CL80'MAIL FROM: <isis@nervm.nerdc.ufl.edu>'
RCPTTO          DC     CL10'RCPT TO:<'
DEST1@          EQU    (*-HEADER)
                DC     CL70' '
                DC     CL80'DATA'
TOPHEAD#        EQU    (*-HEADER)/80
DATE            DC     CL15'DATE:
DATE@           EQU    (*-HEADER)
                DC     CL65' '
                DC     CL80'From:     The FUN system <isis@nervm.nerdc.uflx
                       .edu>'
```

```
               DC      CL40'Subject:          Mail from th   system'
Subject:       EQU     (*-HEADER)
               DC      CL40' '
               DC      CL15'To:
DEST2@         EQU     (*-HEADER)
               DC      CL65' '
*              DC      CL80' '
HDR#           EQU     (*-HEADER)/80
ENDER          DC      CL80' .'
               DC      CL80'QUIT'
               DC      CL80'//'
ENDERS         EQU     (*-ENDER)
ENDER#         EQU     (*-ENDER)/80

*CRTBL         DC      25X'00'
*              ORG     CRTBL+13
*              DC      X'0D'    <CR> TO FIND
*              ORG     CRTBL+255
*
MAX_SECONDS            DC      F'00000005'
FIONBIO        DC      XL4'8004A77E'
SO_REUSEADDRE          DC      F'00000004'
SO_KEEPALIVE           DC      F'00000008'
SO_BROADCAST           DC      F'00000032'
SO_LINGER              DC      F'00000128'
SO_OOBINLINE           DC      F'00000256'
SO_SNDBUF              DC      F'00004097'
SO_ERROR               DC      F'00004103'
SO_TYPE                DC      F'00004104'
DOWTABLE       DS      OD
               DC      XL4'0',C'Sun,'
               DC      XL4'1',C'mon,'
               DC      XL4'2',C'Tue,'
               DC      XL4'3',C'Wed,'
               DC      XL4'4',C 'Thur,'
               DC      XL4'5',C'Fri,'
               DC      XL4'6',C'Sat,'
SATURDAY       DC      XL4'6,C'Sat,'
DOW$           EQU     *-SATURDAY
DOW#           EQU     (*-DOWTABLE)/DOW$
MONTABLE       DS      OD
               DC      XL4'1',C'Jan'
               DC      XL42',C'Feb'
               DC      XL4'3',C'Mar'
               DC      XL4'4',C'Apr'
               DC      XL4'5',C'May'
               DC      XL4'6',C'Jun'
               DC      XL4'7',C'Jul'
               DC      XL4'8',C'Aug'
               DC      XL4'9',C'Sep'
               DC      XL4'A',C'Oct'
               DC      XL4'B',C'Nov'
DECEMBER       DC      XL4,'C',C'Dec'
MON$           EQU     *-DECEMBER
MON#           EQU     (*MONTABLE)/MON$
*SSTDDATA      DS      OH
*
CTLBLOCK       DC      CL(TCPBLEN)' '
*

               DC      CL8'          '
               DC      CL6,000010'
```

```
         DC    CL8'PROCESS'
SPROCESA DC    CL10'VERIFY'
*
         DC    CL8'
         DC    CL6'000016'
         DC    CL8'STATEKEY'
SSTATEKA DC    CL16'XXXXXXXXXXXX'
*
         DC    CL8 ' '
         DC    CL8' '
         DC    CL6'000015'
         DC    CL8'IPADDR '
SIPADDRA DC    CL15'128.227.72.2   '
*
         DC    CL8 '
         DC    CL6'000005'
         DC    CL8'PORTNUMB'
SPORTNMA DC    CL5'03005'
*
         DC    CL8 ' '
         DC    CL6'000020'
         DC    CL8'STUID'
SSTUIDA  DC    CL20' '
*
         DC    CL8' '
         DC    CL6'000015'
         DC    CL8'PASSWORD'
SPASSWDA DC    CL15'
*
         DC    CL8' '
         DC    CL6'000001'
         DC    CL8'RETNCODE'
RRETNCA  EQU   *-RSTDDATA
         DC    CL5' '

         DC    CL8' '
         DC    CL6'000080'
         DC    CL8'RETNMESS'
RRETNMA  EQU   *-RSTDDATA
         DC    CL80' '
RDATALEN EQU   *-RSTDDATA
*
         END   RAMI1S00
```

APPENDIX H

DATA SET RAMI00

1. RAMI0400 FILE RECORD SECT

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```
                 COPY RARARGDA
                 USING RARARGDA,R2

                 COPY RARAMMEN
                 USING REARAMMEN,R12
                 COPY RAMICOMM
                 USING COMMAREA,R5
                 COPY RARATCPB

                 COY RARAEXLG
```

2. WORKING STORAGE

```
                 COPY DFHAID        3270 AID CHARACTERS

                 COPY RAREGS        REGISTER EQUATES
                 EJECT
DFHEISTG         DSECT
                 SCRATCH PAD AREA
                 COPY RARASPAD
                 FIELDS FOR RAMIGETD
FINDFLD          DS     CL8
FINDFLDT         DS     CL79
UPDATE           DS     C


SAVER12          DS     F
TEMP9 DS         DS     CL6
TEMP06           DS     CL6
RGFLUX           DS     CL2
RGAPPT           DS     C
RGDAYO           DS     C
PHASE            DS     C
BADSSNF          DS     C
NOSSNF           DS     C
CREDITS          DS     PL2
CTLKEY           DS     CL3
APPT             DS     CL2
TIMEAP           DS     CL2
DADATE           DS     0CL9
DADUMM           DS     CL1
DAMMDD           DS     0CL4
DAMM             DS     CL2
DADD             DS     CL2
DATEIME          DS     CL4
TIMEALL          DS     OCL5   BHHMM
TIMEBLNK         DS     C
TIMEHH           DS     CL2
TIMEMM           DS     CL2
SYSMMDD          DS     CL4
PTIME            DS     PL4
PSTIME           DS     PL4
```

```
ADD24       DS     PL4
PRTIME      DS     PL4
SYSTIME     DS     OCL6
SYSHHMM     DS     OCL4
SYSHH       DS     CL2
SYSMM       DS     CL2

SYSSS       DS     CL2
REGMTH      DS     CL3
REGDATE     DS     0CL4
REGMM       DS     CL2
REGDD       DS     CL2
REGTIME     DS     CL4
PACK3       DS     PL3
DIVIDEND    DS     OD
QUOTIENT    DS     F
REMAINS     DS     F
DIVISOR     DS     F
SAVETRID    DS     F
SAVER6      DS     F
SAVESELC    DS     F
SAVEMVAR    DS     F
SAVEMVLN    DS     H
TEMPAREA    DS     CL30
SAVESTID    DS     CL20
SAVEPSWD    DS     CL10
SAVEPASS    DS     CL4
      EJECT

      PROGRAM RAMI0400 STARTS HERE
RAMI0400    DFHEIENT      CODERE=(3,8)
RAMI0400    AMODE 31
RAMI0400    RMODE ANY
            L      R5,DFHEICAP
            CLC    EIBCALEN,=H'0'
            BE     RETURN
            EXEC   CICS HANDLE CONDITION DISIDERR(ERROR)
                   ERROR(ERROR) TERMIDERR(ERROR)SYSIDERR(ERROR)
                   ISCINVREQ(ERROR) INVREQ(ERROR) IOERR(ERROR)
                   DISABLED(ERROR) ILLOGIC(ERROR) LENGERR(ERROR)
                   NOTAUTH(ERROR)

            EXEC   CICS HANDLE CONDITION NOTFND(NOTEND) NOTOPEN(NOTOPEN)
START       EQU    *
            XC     NUMCHEC,NUMCHECK
            MVC    COMAFNDF,=C'MDASPSWD'   DATA IDENTIFIER
            BAL    R4,GETDATA              GO GET IT

            XC     SAVEPSWD,SAVEPSWD       INIT FIELD

            LH     R14,=H'10'              LENGTH OF DATA
            LA     R15,SAVEPSWD            PUT DATA HERE
            MVC    COMAFNDF,=CMDASPSW2'    DATA IDENTIFIER
            BAL    R4,GETDATA              GO GET IT
            CLC    SAVEPSWD,BLANKS
            BNH    NO2ND
            CLC    SAVEPSWD,COMASELC
            BNE    NOTSAME
            MVI    COMASELC+4,C','
            MVC    COMASELC+5(4),SAVEPSWD
```

```
*
NO2ND         MVC   SAVESELC,COMASELC
              MVC   COMAIBFN,BLANKS
*
              EXEC  CICS LINK PROGRAM('RAMI1S00') COMMAREA(COMMAREA)
                          LENGTH(COMACOML)
              CLI   COMAERRF,C'Y'                SUCCESSFUL READ?
              BE    RETURN                       NO, GET OUT

              CLC   COMAIBFN,BLANKS              SUCCESSFUL RETURN
              BH    GOBACK                       NO, GET OUT

              B     GETRCOD

              MVC   COMNAIBFN,=C'8'
              B     PUTERROR
NOTSAME       EQU   *
              MVC   COMAIBFN,=C'10'
              B     RETURN
BAD           EQU   *
              MVC   COMAIBFN,=C'6'
              B     PUTERROR
IBFN16        EQU   *
              MVC   COMAIBFN,=C'16'
              B     PUTERROR
FORCE         MVC   COMAIBFN,=C'3'
              MVC   COMAPASS,SAVESELC
              B     RETURN
ERROR         EQU   *
NOTOPEN       EQU   *
NOTFND        EQU   *
              B     PUTERROR
PUTERROR      EQU   *
MVC     COMAMESS(8),=C'CONTINUE'
              MVI   COMAERRF,C'Y'
              B     RETURN
PINOK         EQU   *
              MVC   COMAVUID(9),COMAEXSS
              MVC   COMATOPC,COMATARG
              MVC   COMAEXSS+3(6),SAVESTID+13
*
              CLC   COMAEXSS,BLANKS
              BH    CKSSNNUM
              MVI   NOSSNF,C'Y'
              B     READMMEN
*
CKSSNNUM      MVZ   NUMCHEC,COMAEXSS
              CLC   NUMCHEC(9),NUMZONE
              BE    SSNOK
              MVI   BAEDSSNF,C'Y'
              B     READMMEN
*
SSNOK         EQU   *
              MVC   COMASELC(4),SAVESTID+3
*
CKFORCE       CLC   COMADATA(5),=C'FORCE'
              BNE   DOPIN
*
              MVI   COMASELC+4,C','
              MVC   COMASELC+5(4),SAVESTID+3
```

```
*
                LH    R14,=H'4'              LENGTH OF DATA
                LA    R15.SAVEPASS           PUT DATA HERE
                MVC   COMAFNDF,=C'PASSWORD'  DATA IDENTIFIER
                BAL   R4.GETDATA                GO GET IT
                CLC   SAVEPASS,BLANKS
                BNH   DOPIN
                MVC   COMPASS,SAVEPASS

        DO PIN ROUTINE
DOPIN           EQU   *
                MVC   SAVETRID,EIBTRNID
                MVC   IEBTRNID,=C'RA56'
                MVC   COMASAVP,=C'RAMI0500'
                EXEC CICS LINK PROGRAM('RAGA3000') COMMAREA(COMMAREA)
                      LENGTH(COMACOML)
                MVC   EIBTRNID,SAVETRID

                CLC   COMASELC(5)M=C'+0050             EXPIRED?
                BNE   PUTFIX
                MVI   COMASELC+4MC'1'                  EXPIRED?

PUTFIX          MVI   COMASELC,C'0'              <---------TEMP FIX!!!!!
*
                MVC   COMARCOD(5)MCINASELC
                MVC   COMARMES,BLANKS
*
                B     RETURN
*
*
*GOBACK         EQU   *
RETURN          EXEC  CICS RETURN
*
PUTDATAE        MVC   0((*-*,R12),0(R6)
BUMPADD         LA    R12,(*-*)(R12)
*
                COPY  RAMIGETP
NUMZONE         DC    12C'0'                ZONES
BLANKS          DC    CL120' '
MAXWORK         DC    HL2'2000;
                SPACE
                EJECT
                LTORG                       RETURN TO CICS

         END    RAMI0400
***************************************************************************************************
                                  EROBBIN
                                   S3030

JOBID                       TSU09089
JOB NAME:                   EROBBIN
UERID:                      EROBBIN
SYSOUT CLASS:               A
OUTPUT GROUP:               4        .00001.00001
TITLE:

DESTINATION:                UFG3820
NAME:                       ROBBINS, EARL
```

```
ROOM:
BUILDING:
DEPARTMENT:
ADDRESS:

PRINT TIME:          11:37:13 AM
PRINT DATE:          11 AUG 1998
PRINTER:             PRT6
SYSTEM ID:           NER1
**********************************************************************************

**********************************************************************************
                              EROBBIN
                               S303

JOBID:               TSU0989
JOB NAME:            EROBBIN
USERID:              EROBBIN
SYSOUT CLASS:        A
OUTPUT GROUP:        5
TITLE:

DESTINATION:         UFG3820
NAME:                ROBBINS, EARL
ROOM
BUILDING:
DEPARTMENT:
ADDRESS:

PRINT TIME:          11:37:24 AM
PRINT DATE:          11 AUG 1998
PRINTER:             PRT6
SYSTEM ID:           NER1

TSO FOREGROUND HARDCOPY

DSNAME=RA.PATENT                (RAMI0600)

          DATA SET RAMI0600

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          COPY  RARAMDAS
          USING RARAMDAS,R9
          COPY  RARARGDA
          USING RARARGDA,R12
          SPACE

2.     WORKING STORAGE

          COPY  DFHAID                 3270 AID CHARACTERS
          SPACE                        REGISTER EQUATES
DFHEISTG  DSECT                        COMMAREA DSECT

          SCRATCH PAD AREA

TMPKEY    DS    0CL16
TMPTIME   DS    PL8
```

```
TMPMDASK    DS     CL8

LINE        DS     CL80
MIDASSTE    DS     CL8
COUNT       DS     PL3
ABCODE      DS     CL4
            COPY   RARASPAD
            EJECT


RAMI0600    DFHIENT       CODEREG=(3,8)
RAMI0600    AMODE 31
RAMI0600    RMODE ANY
            SPACE

            REQUIREMENT CHECKING AND EVLAUATION ROUTINES


            EXEC CICS HANDLE CONDITION DSIDERR(ERROR)
            ERROR(ERROR) TERMIDERR(TRMIDERR)SYSIDERR(ERROR)
            ISCINVREQ(ERROR) INVREQ(ERROR) IOERR(ERROR)
            DISABLED(ERROR) ILLOGIC(ERROR) LENGERR(ERROR)
            NOTAUTH(ERROR) DUPREC(ERROR)

       EXEC CICS HANDLE ABEND LABEL (HNDABND)

       EXEC CICS HANDLE CONDITION NOTOPEN(NOTOPEN)
       MVC    MDASKEYY,TMPMDASK
       MVT    MDASKEYY,C'0'
       EXEC CICS WRITE FILE('RAMDAS') FROM(RARAMDAS)
              LENGTH(HALFWORD) RIDFLD(MDASKEYY)

       AP     COUNT,=P'1'

       ----DEQ RESOURCE----

              EXEC CICS DEQ RESOURCE(MIDASSTE) LENGTH(8)
              B       NEXT

ERROR         EQU  *
       MVC    LINE(41),=C'THERE WAS AN ERROR PROCESSING THE REQUEST
       B      SENDLIN
TRMIDERR      EQU
       B      RETURN

NOTOPEN       EQU
              MVC    LINE(38)=0TATE FILE OR ALTERNATE INDEX NOT OPEN
              B      SENDLINE
NOTFND        EQU  *
              MVC    LINE(30),=C'REQUESTED RECORD WAS NOT FOUND'
              B      SENDLINE
STARTAGN      EQU  *
              EXEC CICS START TRANSID('MI06'
ALLDONE       EQU
              MVC    LINE,MESSMI06
              UNPK   LINE+39(3),COUNT
              OI     LINE+41,C'0'
*
SENDLINE      EQU
      EXEC    CICS HANDLE CONDITION INVREQ(RETURN) NOTALLOC(RETURN)
```

```
                                                                        00561202
             EXEC CICS SEND FROM(LINE)                                  00561402
*                                                                       00561502
RETURN       EQU   *                                                    00561602
             EXEC CICS DEQ RESOURCE(MIDASSTE) LENGTH(8) NOHANDLE        00561804
*                                                                       00561902
RETURN2      EQU   *                                                    00562002
HNDABND      EQU   *                                                    00562102
             EXEC CICS ASSIGN ABCODE(ABCODE)                            00562202
             EXEC CICS ABEND ABCODE(ABOCED) NODUMP                      00562301
             B        RETURN                                            00562401
                                                                        00562801
                                                                        00563401
BLANKS       DC       CL80' '                                           00563500
MESSMI06DCCL80'MI06 COMPLETED SUCCESSFULLY, PROCESSED RECORDS           00563600
                                                                        00563700
                                                                        00564000
             LTORG                                                      00565000
                                                                        00565100
             END      RAMI0600                                          00566000
```

APPENDIX J

nirvana.c—EAGLE transfer client for Web server.
Written by Michael Lucas for the University of Florida
November 11, 1998 http://www.reg.ufl.edu

Incorporates client.c by Tom Kelliher and getcgivars.c from NCSA

Ver 1.1.6 build 0 Robustified(tm)!

Program flow

This program is started by a call from a Web page which contains a form. Data is passed via a CGI string which is then parsed via the standard NCSA getcgivars.c program into a tow-dimensional array of strings: name of the filed paied with the value for the field. (Note that the program must be compiled in a directory where getcgivars.c exists, or is in the path.)

This program then sends a message to the appropriate CICS server and port (both defined near the top of this program) to start the transaction MI00.

When CICS receives this call it responds with OKTOSEND to indicate readiness to receive data. This program then sends all the CGI date in the form
8-byte-field-name field-data carriage-return
without the spaces (eg; MYFIELDNTHISISTHEDATA\n).

When CICS has received the data it then does magic and returns a 50-byte data descriptor and a fully-marked-up Web page. This program plarses the stream and writes the page to standard out, where it is picked up by the CGI form and sent as a Web page to the browser that originally called it.

RECENT CHANGE LIST
11/03/1998 ver 1.1.4 "Robustified!"
Repaired code that sent garbage to Web browser on dead socket call, causing random text boxes or garbage to appear
APPENDIX J
11/17/1998 ver 1.1.5
Added alarms piped to pdie, to prevent child processes forked by the SP from running forever if they fail to receive the needed information from the data client (e.g. CICS abend or online application hork by an AOL user).

11/19/1998 ver 1.1.6
Modified die and pdie to accept the socket address so they canclose the socket on err. Modified all calling functions pass sock to die and pdie.

```
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <netdb.h>
#include <stdio.h>
```

```
#include <stdib.h>
#include <signal.h>
#include "getgivar.c"

#ifdef          prod
        #define SERVER_PORT 9999                    production port
#else
        #defind SERVER_PORT 9999                    test port
#endif

#define BUFFER_SIZE  10240                          Input info string
#define MAX_STRING_LENGTH 20480
#define CTL_BUFFER_SIZE 60                          Output info string
#define UF_CICS "mvs.your.site"                 CICS server
#define NUMBER_OF_XFER_ATTEMPTS  5
#define TRANS_TYPE "MI00"
#define DIAG_MSG_SIZE 8
#define OK_MSG "GOTDATAOK"
#define SPACES "        "

        prototypes

void die (const char *, int);
void die (const char *, int);

void print_top(void);
void zero_pad(int, char *);

main

int main (int argc, char *argv[])
        {
        int sock;                                       fd for socket connection
        struct sockaddr_in server;              Socket info. for server
        struct sockaddr_in client;              Socket info. about us
        in clientLen;                                   Length of client socket struct.
        struct hostent *hp;                             Return value from gethostbyname()
        char buf [BUFFER SIZE];                         Received data buffer
        char html_out{MAX_STRING_LENGTH];                       Build string for output
        register int I;                                 loop counter
        int byte_out = 0;                       Total bytes sent on a socket write
        int byte_in = 0;                        Total bytes received on a socket read
()
        int count = 1                           miscellaneous counter
        int byte_tot = 0;
        register int rec_size = 0;
        register int rec_size = 0;
  char **cgivars;
        char outbut[CTL_BUFFER SIZE];                           Data written to the socket
        char outbuf2[BUFFER_SIZE];              Data written to the socket
        char zero_stg[6];
        int var_size = 0;                               Holds the length of the cgi variable
        char holder[25];


                Install the signalling system to abort processing in case of error.

        signal(SIGALRM, die("No response from data client.  Nirvana terminating.",
s  ck));
```

```
 alarm(600);

           Parse th  cgi string and pull out a 2d array of data

 cgivars = getcgivars() ;

           Open a TCP socket and send message.
 if ((sock = socket (AF_INET, SOCK_STREAM, 0)) < 0)
           pdie("Couldn't open stream socket",sock);

   Prepare to connect to server.

 bzero((char *) &server, sizeof(server));
 server.sin_family =AF_INET;
 if ((hp = gethostbyname(UF_CICS)) == NULL)

           {
           printf("%s: unknown host\n", UF_CICS);
           die(buf, sock);
           }
 bcopy(hp->h_addr,&server.sin_addr, hp->h_length);
 server.sin_port = htons((u_short) SERVER_PORT);

   Try to connect.

 if (connect(sock, (struct sockaddr*) &server, sizeof(server)) ,0)
           pdie("Couldn't connect stream socket", sock);

   Determine what prot client's using.

 clientLen = sizeof(client);
 if(getsockname() overwrote name structure", sock);

   Prepare to send to CICS to kick off the transaction.

 if (byte_out = write(sock, TRANS_TYPE, sizeof(TRANS_TYPE)) < 0 )
 pdie("Couldn't write TRANS_TYPE on stream socket", sock);

   Check that CICS is happy and ready to receive data.

 if (byte_in = read(sock, buf, DIAG_MSG_SIZE))           If we got data
         {
         if(stemp(buf,"OKTOSEND"))                              Check for ready

                 die("CICS did not reply ready.", sock);
                   These brackets are needed to define the scope of the IF ELSE
condition.


else
         pdie("No answer from socket reading ready message from CICS.",
sock);

         Start formatting the HTML page.

print _top();

         Flush the strings.

bzero(html_out, sizeof(html_out));
bzero(outbuf2, sizeof(outbuf2));
```

Copy the Web page variabl s to the output string in this format:

8 spaces, variabl length(6), variable name, variable data, newline.
Copy until out of data.

```
for (I=0; cgivars[I]; I++)
          {
          bzero (holder, sizeof(holder));
```

Pull any button data

```
            if (! stemp (cgivars[I], "MIDASBTN"))
                    I + = 2;
            var_size = strlen (cgivars[I + 1]);
            zero_pad(var_size, zero_stg);
            strcat(outbut2, zero_stg);
            sprint(holder, "%d", var_size);
            strcat(outbuf2, holder);
            strcat(outbuf2, cgivars[I]);
            strcat(outbuf2, cgivars[+ +I]);
            strcat(outbuf2, "\n");
            }
```

Move the length info to the beginning of the output stream.
It will be the length of outbut PLUS the information itself.

```
rec_size = (CTL_BUFFER_SIZE + strlen(outbuf2));


          zero_pad)rec_size, zero_stg);


          sprintf(html_out,"%s%d", zero_stg_rec_size);

strcat(html_out,"                                                   ");
                0         1       2       3       4       5
```

Add the output buffer to the transmission string.

```
          strcat(html_out, outbuf2);
```

Write html_out to the socket.

```
          count = 1;
          byte_tot = 0;
          while (byte_tot < rec_size)
                    {
                    if ( ! (byte_out = write(sock,html_out, rec_size)))
                              count + +;
                    if (byte_out < 0)
                              pdie("Exceeded number of write attempts on socket", sock);
                    byte_tot + = byte_out;
                    }
```

Clear all buffers and counters to prepare to read CICS r sponse.

```
         count = 1;
        rec_siz   = 0;
        byte_tot = 0;
        bzero(buf, sizeof(buf));
        bzero(outbuf2, sizeof(html_out));

                Read the CICS response from the socket.

          if ( ! (byte_in = read(sock, buf, CTL_BUFFER_SIZE)))
                   {
                          If null read, increment bad read counter and test for excess.
                     count + +;
                     if (count = = NUMBER_OF_XFER_ATTEMPTS)
                          pdie("Excess number of failed reads on initial socket read.  Check




        communications", sock);
                          }
                else       We got data on the read, continue
                          {
                            Move the first 6 bytes of buf into outbuf2

                          strncpy(outbuf2,buf,6);
                          rec_size = atoi(outbuf2);
                          byte_tot = rec_size – byte_in;

                          if (byte_in < 0)
                                  pdie(buf, sock);

                            Skip the control info and copy the remainder to the Web output buffer.


                          for(i = 0; i < byte_in; i + +)
                                  printf("%c", buf[(i + CTL_BUFFER_SIZE)]);

                          }

               If we didn't get the entire stream in the first pass, loop until we do.

        while (byte_tot > 0)
               {
               bzero(buf. sizeof(buf));

               byte_in = read(sock, buf, byte_tot);

      if (byte_in < 0)
                         pdie("Died  while in the socket reading loop", sock);
              if(count = = NUMBER_OF_XFER_ATTEMPTS)
                         pdie("Exceeded number of dead reads on loop socket read",
sock);
              if(byte_in = = 0)                    If dead read on socket

                        count + +;                       increment bad-read counter
                                }
              else
                        {
                        byte_tot- + byte_in;
```

```
                    printf(“%s", buf);          Send but to webs  rver
                    count = 0;                          Reset bad-read counter
                    }
                }

        Send confirmation back to CICS

  if(byte_tot < = rec_size)         which will be true if
   {                                we got the data
        if ( ! (byte_out = write(sock, OK_MSG, sizeof(OK_MSG))))
                pdie("Died while confirming transmission received",sock);

        }

  Write out the end-html string to the Web server

 printf("</body></html>");

          Close this connection.

        close(sock);

        }

 End of main




  pdie — Call perror() to figure out what's going on and die.


 void pdie(const char *mesg, int sock)
        {
        printf(“<docy bgcolor=cc0000 text = ffffff><title>Error Report</title>\n");
        printf(“<h3<>center>Application Error Report </h3<>hr>\n");
        printf(“<br><I>Problem: </I> %s.  Check your data and try
reloading. <br>\n",mesg);
        perror(mesg);
        printf(“<hr></center></body></html>");
   close(sock);
        exit(1);
        }

  die --- Print a message and die.


void die(const char *mesg, int sock)
        {
        printf(“<br><i>Error! : %.  Try reloading, or contact support.\n",mesg);
        fputs(mesg, stderr);
        fputc('\n', stderr);
close(sock);
        exit(1);
        }
```

print_top --- Start output of the HTML page

```
void print_top(void)
        {
        printf("Content-type: text/html\n\n");
        printf("<html>\n")
        printf("<! All information in this document, including the transport>\n);
        printf("<! mechanism and protocols, are copyright 1998 by the >\n");
        printf("<! University of Florida.  All rights reserved. >\n");

          Uncomment the following line to enable no-cache for production.

          printf(",META HTTP-EQUIV = \"        Pragma\"Content=\"no-cache\">\n");
```

zero_pad --- Adds the leading zeros to the data length description

```
void zero_pad(int rec_size, char *zero_stg)
        {

        bzero(zero_stg, sizeof(zero_stg));

        if (rec_size < = 9)
                strcpy(zero_stg, "00000");
        else if (rec_size <=99)


        strcpy(zero_stg, "0000");
else if (rec_size <= 999)
        strcpy(zero_stg, "000);
else if (rec_size < 9999)
        strcpy(zero_stg, "00");
else if (rec_size < = 9999)
        strcpy(zero_stg, "0");
```

What is claimed is:

1. A method of providing Web access to data, the steps comprising:

providing a Web server for distribution of data to users;

providing a database on a database computer operably connected to the Web server, the database having a database program that provides data in a given format;

upon a user requesting data in the database, the Web server forwarding the request to the database, the data base program accessing the data in the given format, the database computer running a Web control program that generates a Web page with the requested data and supplies the generated Web page to the user.

2. The method of Claim 1 wherein the Web control program marries file definition objects and page definition objects to generate Web pages.

3. The method of Claim 1 wherein the Web server is on a Web server computer different from the database computer.

4. The method of Claim 3 wherein the database computer is a mainframe computer.

5. The method of Claim 4 wherein the mainframe computer supplies the generated Web page to the user via the Web server computer.

6. The method of Claim 4 wherein, upon a user requesting data not in the mainframe computer, the Web control program causes the mainframe computer to access data on a remote computer and the Web control program then generates a Web page with the requested data and supplies the generated Web page to the user.

7. The method of Claim 4 wherein, responsive to a user, the Web control program calls a subroutine on the mainframe computer, which subroutine is independent of the Web control program and is a legacy subroutine.

8. The method of Claim 4 further including the steps of: having a user supply an identification code, forwarding the identification code from the Web server computer to the mainframe computer, the Web control program then generating a state key, incorporating the state key into a Web page supplied to that user, and wherein the mainframe computer detects the state key from the Web page upon the user requesting data and decides whether that user can access the requested data based on the state key.

9. The method of Claim 8 wherein the state key is randomly generated for a given access session and the state key loses its ability to authorize data access if it is not sent by the user to the mainframe computer at least once during a time-out interval.

10. The method of Claim 4 wherein the Web control program receives a page change command from a user using a Web browser and, responsive to the page change command, the Web control program changes a given Web page to a changed Web page such that any users accessing the given Web page now receive the changed Web page, the page change command changing the appearance of a given Web page.

11. The method of Claim 1 further including the steps of: having a user supply an identification code, the Web control program then generating a state key, incorporating the state key into a Web page supplied to that user, and wherein the database computer detects the state key from the Web page upon the user requesting data and decides whether that user can access the requested data based on the state key.

12. The method of Claim 1 wherein the Web control program receives a page change command from a user using a Web browser and, responsive to the page change command, the Web control program changes a given Web page to a

changed Web page such that any users accessing the given Web page now receive the changed Web page, the page change command changing the appearance of a given Web page.

13. A method of providing Web access to data, the steps comprising:

providing a Web server for distribution of data to users;

providing a database on a database computer operably connected to the Web server, the database having a database program that provides data in a given format;

providing a Web control program on the database computer;

having a user supply an identification code to the Web server, the Web control program then generating a state key and incorporating the state key into a Web page supplied to that user, and wherein the database computer detects the state key from the Web page upon the user requesting data and decides whether that user can access the requested data based on the state key.

14. The method of Claim 13 wherein the state key loses its ability to authorize data access if it is not sent by the user to the database computer at least once during a time-out interval.

15. The method of Claim 14 wherein the Web server is on a Web server computer different from the database computer.

16. The method of Claim 15 further including the step of forwarding the identification code from the Web server to the database computer.

17. The method of Claim 16 wherein the database computer is a mainframe computer.

18. The method of Claim 17 wherein the state key is randomly generated for a given access session.

19. The method of Claim 13 wherein the state key is randomly generated for a given access session.

20. A method of managing a Web site, the steps comprising:

providing a Web control program on a computer;

having the Web control program receive a page change command from a user using a Web browser to access the Web site; and,

responsive to the page change command, the Web control program changing a given Web page to a changed Web page such that any users accessing the given Web page now receive the changed Web page, the page change command changing the appearance of a given Web page.

21. The method of Claim 20 wherein the Web control program marries file definition objects and page definition objects to generate Web pages.

22. The method of Claim 21 wherein the computer having the Web control program is a mainframe computer and users request data on the mainframe computer via a Web server on a Web server computer.

23. The method of Claim 22 wherein the Web control program generates HTML through a completely table driven process, independent of file definitions and page definitions.

24. The method of Claim 23 further including the steps of: having a user supply an identification code, forwarding the identification code from the Web server computer to the mainframe computer, the Web control program then generating a state key, incorporating the state key into a Web page supplied to that user, and wherein the mainframe computer detects the state key from the Web page upon the user requesting data and decides whether that user can access the requested data based on the state key.

25. The method of Claim 22 further including the steps of:

providing a database on the mainframe computer, the database having a database program that provides data in a given format;

upon a user requesting data in the database, the Web server forwarding the request to the database, the database program accessing the data in the given format, and, by operation of the Web control program, generating a Web page with the requested data and supplying the generated Web page to the user.

FIG. 1

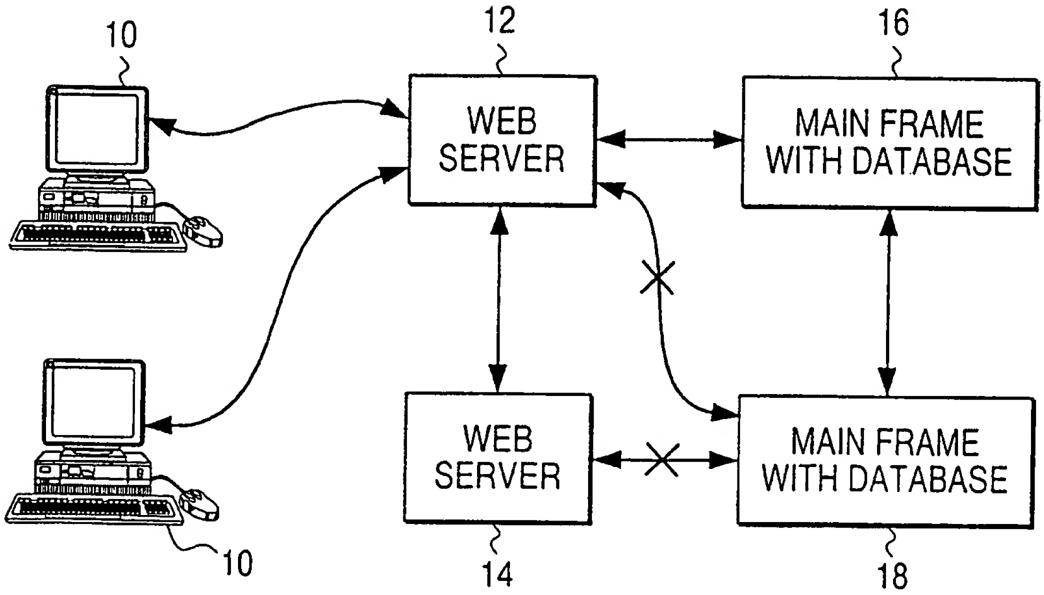
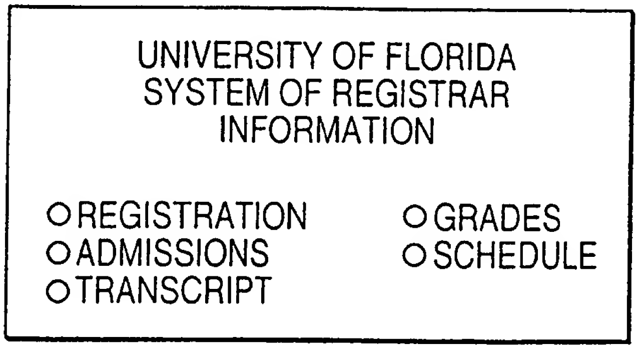
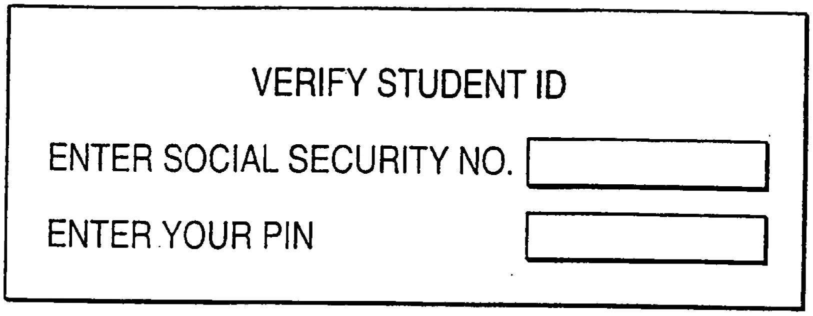


FIG. 2


UNIVERSITY OF FLORIDA
SYSTEM OF REGISTRAR
INFORMATION

○ REGISTRATION
○ ADMISSIONS
○ TRANSCRIPT
○ GRADES
○ SCHEDULE

FIG. 3

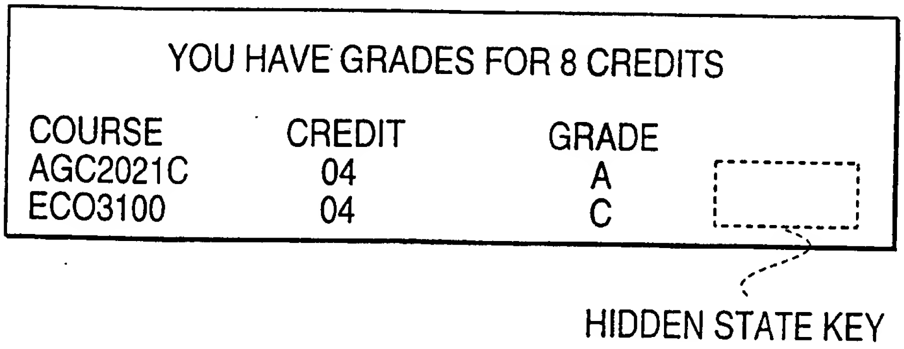


VERIFY STUDENT ID

ENTER SOCIAL SECURITY NO. □

ENTER YOUR PIN □

FIG. 4



YOU HAVE GRADES FOR 8 CREDITS

COURSE	CREDIT	GRADE
AGC2021C	04	A
ECO3100	04	C

FIG. 5A

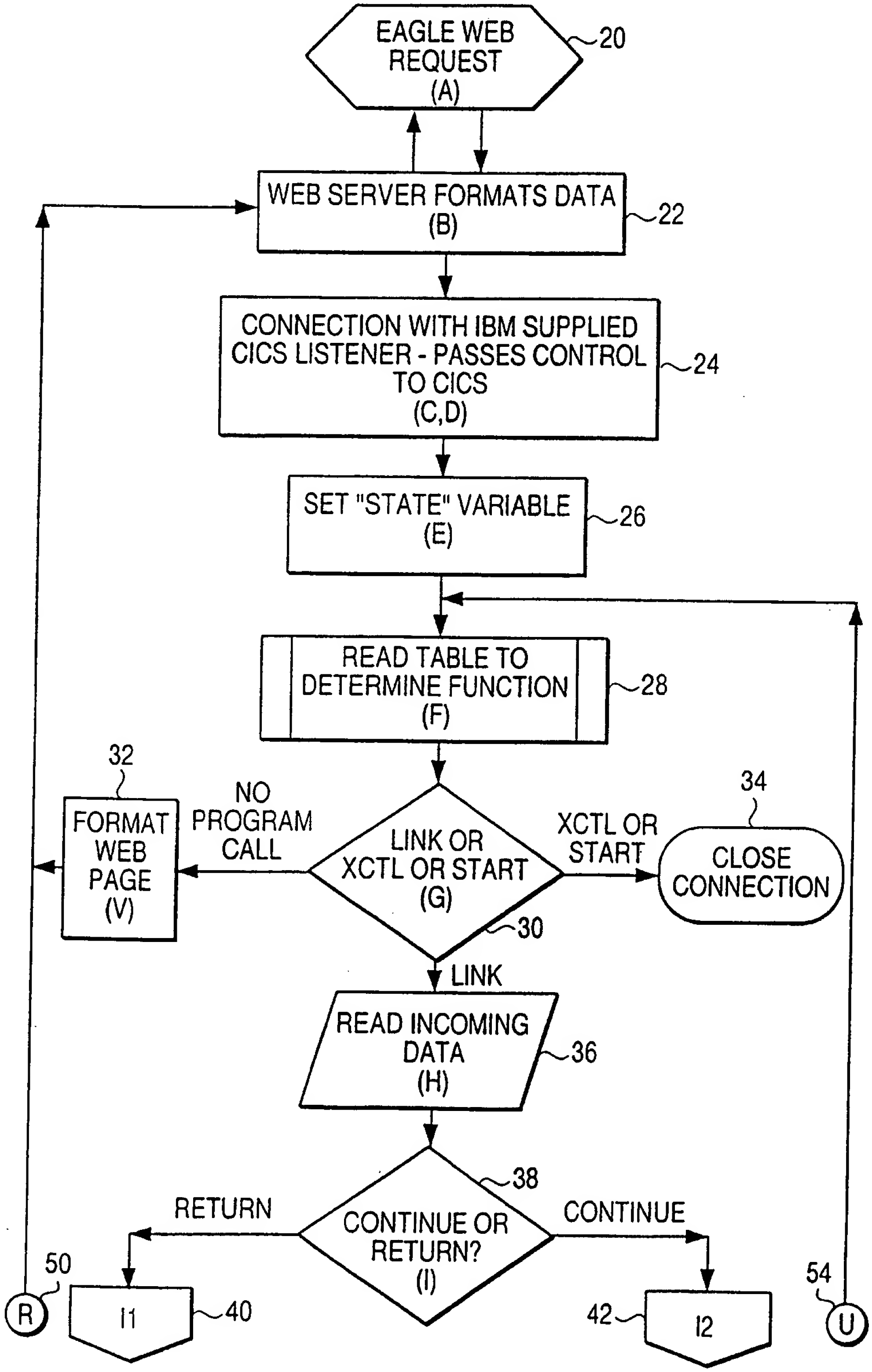

EAGLE WEB REQUEST (A)
20
WEB SERVER FORMATS DATA (B)
22
CONNECTION WITH IBM SUPPLIED CICS LISTENER - PASSES CONTROL TO CICS (C,D)
24
SET "STATE" VARIABLE (E)
26
READ TABLE TO DETERMINE FUNCTION (F)
28
32
FORMAT WEB PAGE (V)
NO PROGRAM CALL
LINK OR XCTL OR START (G)
30
XCTL OR START
34
CLOSE CONNECTION
LINK
READ INCOMING DATA (H)
36
38
RETURN
CONTINUE OR RETURN? (I)
CONTINUE
50
R
I1
40
42
I2
54
U

FIG. 5B

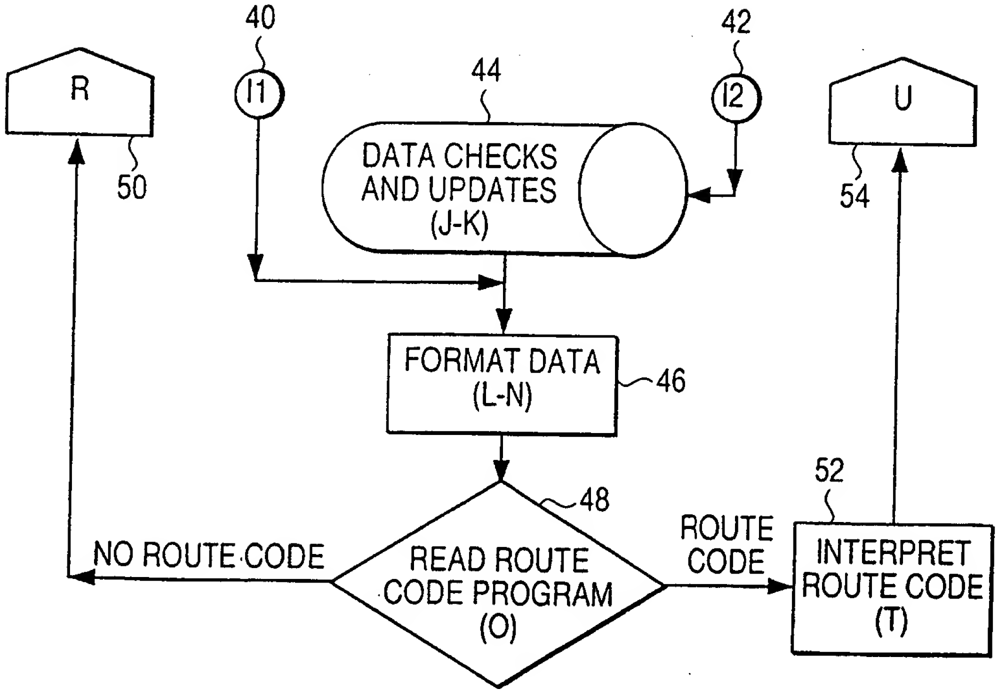

40
42
44
R
I1
I2
U
DATA CHECKS AND UPDATES (J-K)
50
54
FORMAT DATA (L-N)
46
52
48
ROUTE CODE
NO ROUTE CODE
READ ROUTE CODE PROGRAM (O)
INTERPRET ROUTE CODE (T)

FIG. 6

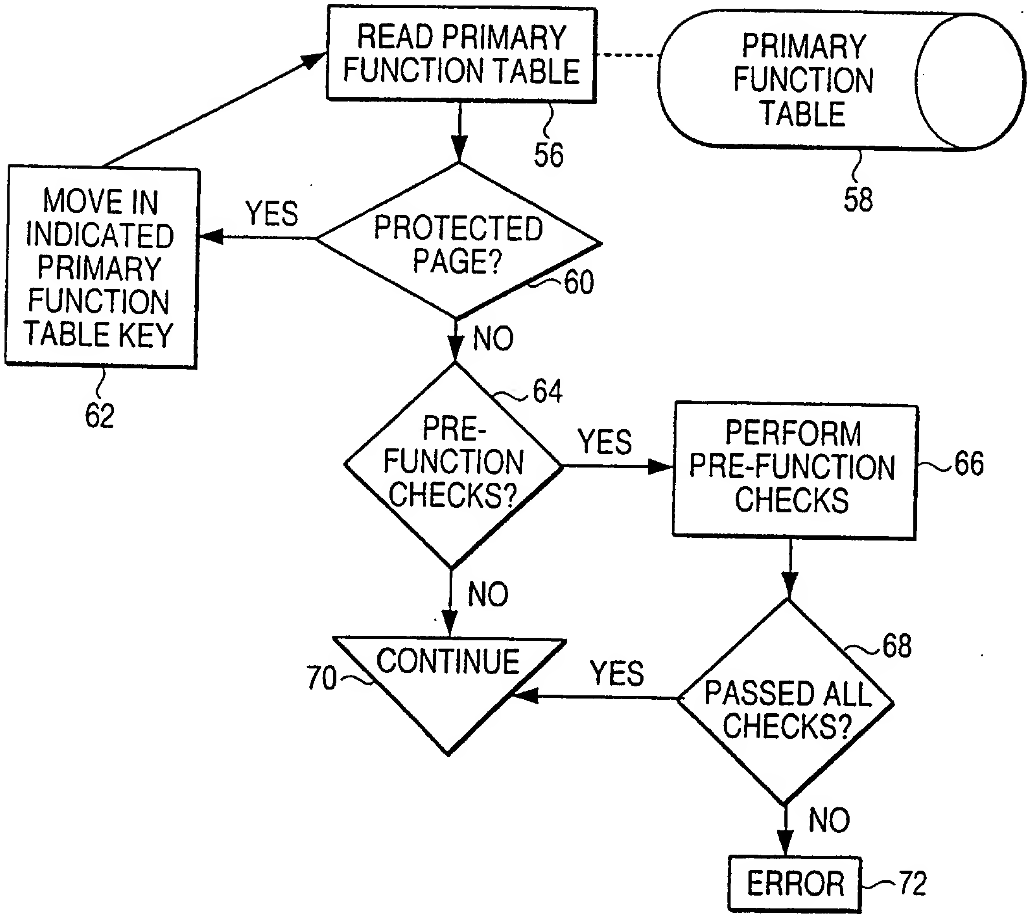

READ PRIMARY FUNCTION TABLE
56
PRIMARY FUNCTION TABLE
58
MOVE IN INDICATED PRIMARY FUNCTION TABLE KEY
62
YES
PROTECTED PAGE?
60
NO
64
PRE-FUNCTION CHECKS?
YES
PERFORM PRE-FUNCTION CHECKS
66
NO
CONTINUE
70
YES
68
PASSED ALL CHECKS?
NO
ERROR
72

FIG. 7

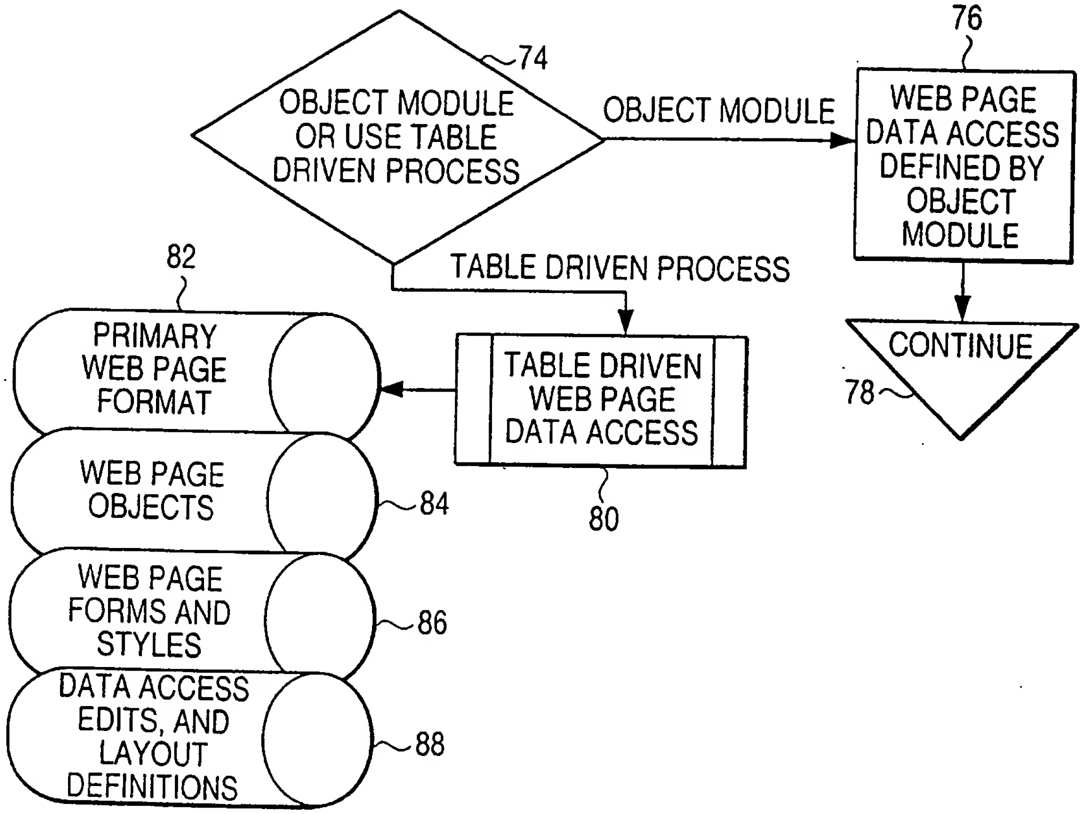
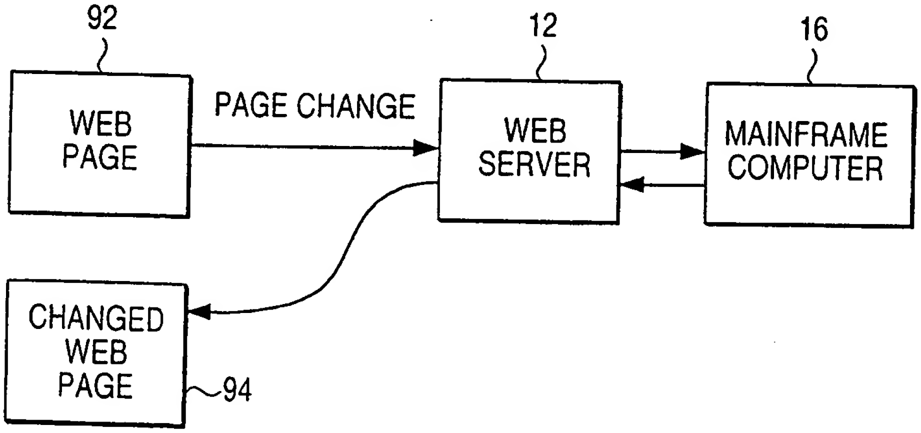

OBJECT MODULE OR USE TABLE DRIVEN PROCESS
74
OBJECT MODULE
76
WEB PAGE DATA ACCESS DEFINED BY OBJECT MODULE
TABLE DRIVEN PROCESS
CONTINUE
78
82
PRIMARY WEB PAGE FORMAT
TABLE DRIVEN WEB PAGE DATA ACCESS
80
WEB PAGE OBJECTS
84
WEB PAGE FORMS AND STYLES
86
DATA ACCESS EDITS, AND LAYOUT DEFINITIONS
88

FIG. 8


92
WEB PAGE
PAGE CHANGE
12
WEB SERVER
16
MAINFRAME COMPUTER
CHANGED WEB PAGE
94

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/28321

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 15/00, 17/30
US CL : 707/9, 10; 709/202, 218
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 707/9, 10; 709/202, 218, 200, 203, 217, 219

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST, WEST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	US 5,793,964 A (ROGERS et al) 11 August 1998, see Figures 9-11, column 3, line 20- column 7, line 53, column 9, line 26- colums 10, line 43, column 17, line 49- column 18, line 60.	1-25
X, P	US 5,974,441 A (ROGERS et al) 26 October 1999, see the abstract, Figures 9-11, column 19, line 50- column 20, line 62.	1-25
A, P	US 5,926,180 A (SHIMAMURA) 20 July 1999, see the whole document.	1-25
A	US 5,715,453 A (STEWART) 03 February 1998, see the whole document.	1-25

□ Further documents are listed in the continuation of Box C. □ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

16 MARCH 2000

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12 APR 2000

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